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No. 9

## FILLED TO THE LIMIT.

A summary of work under way in the several yards of the American Ship Building Co. on the great lakes for delivery in 1902 shows twenty-three vessels costing \$6,330,000. All are steel steam vessels and all but three of them are freighters ranging in capacity from 4,800 to 6,200 gross tons. The combined capacity of the twenty freighters in a single trip will be 109,750 gross tons. These orders are sufficient to cause a continued rush of work in the eight yards of the consolidated lake companies until about June 1 next. The passenger vessels are the two large side-wheelers which are to inaugurate a new service between Detroit and Buffalo next season, and a large excursion steamer of the Tashmoo kind, which is to be operated in connection with that steamer on the Detroit and St. Clair rivers. It is more than probable that one of the freighters in the list, a steamer building at Lorain for W. H. Mack and others, will be completed in time to make three or four trips before the close of navigation this season, but on the other hand the summary of ships for delivery next spring does not, of course, represent all the new work which the American company has on hand. There are still eight steel steamers under way that were scheduled for completion this season. This list includes two steamers of 6,400 gross tons capacity each at Chicago for the Peavey Steamship Co. of Duluth; two steamers at Cleveland, building for salt-water service and which are to carry on deep ocean draught 7,000 tons

the dock was submerged, or partly so, would splash about and cause considerable motion to the structure.

When it is necessary to dock a vessel, water is admitted to the compartments through sixteen valves, each 16 in. in diameter, and it requires about an hour to sink the dock so that craft can enter it. After the dock is sufficiently deep in the water the vessel enters, and having been accurately adjusted, the water is pumped out of the compartments by means of eight pumps, which are driven by four engines that have four boilers of water tube type and of 135 H.P. each to supply them with steam. The pumping apparatus is so arranged that either engine can steam from either boiler, and in case of a breakdown on one side of the dock the pair of pumps on the other could do all the pumping. It takes about three hours and a half to raise the dock. The pumps also operate a line of hose, which is employed to wash the slime from the hulls of vessels that are docked. This is quite a task, for the amount of fouling which is washed from the sides of a large ship is considerable, and after it has been cleaned the stuff has also to be washed from the floor of the dock, otherwise the men could not work about the craft.

Although a great number of shores are not used to support the vessel in the dock, as the American plan of docking craft provides for supporting them at the bottom on each side of the keel, this dock has four mechanical side shores for centering vessels accurately in it. They are marked with

Particulars of twenty-three Steel Steamers under order with the American Ship Building Co., (consolidated lake yards) for delivery in Spring of 1902.

To be built in	Type.	Dimensions in feet.				Dimensions of engines. All triple expansion.	Boilers—dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons, 18 ft. draught.	Value.	For whom building.
		Over all.	Keel.	Beam.	Depth.							
Cleveland	Cargo stmr.	436	416	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Ellis & Eaves..	170	6,200	\$260,000	John Mitchell, et. al., Cleveland.
Cleveland	Cargo stmr.	436	416	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Ellis & Eaves..	170	6,200	260,000	John Mitchell, et. al., Cleveland.
Lorain	Cargo stmr.	400	380	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Howden .....	170	5,600	240,000	J. C. Gilchrist, Cleveland.
Lorain	Cargo stmr.	400	380	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Howden .....	170	5,600	240,000	J. C. Gilchrist, Cleveland.
Lorain	Cargo stmr.	400	380	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Howden .....	170	5,600	240,000	J. C. Gilchrist, Cleveland.
Lorain	Cargo stmr.	400	380	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Howden .....	170	5,600	240,000	J. C. Gilchrist, Cleveland.
Lorain	Cargo stmr.	400	380	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Howden .....	170	5,600	240,000	J. C. Gilchrist, Cleveland.
Lorain	Cargo stmr.	400	380	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Howden .....	170	5,600	240,000	J. C. Gilchrist, Cleveland.
Lorain	Cargo stmr.	366	346	48	28	20, 33½, 55x40....	Two Scotch, 12-10x13....	Natural .....	170	4,800	220,000	W. H. Mack, Cleveland.
Buffalo	Cargo stmr.	400	380	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Howden .....	170	5,600	245,000	W. W. Brown syndicate, Cleveland.
Bay City	Cargo stmr.	434	414	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Ellis & Eaves..	170	6,200	260,000	W. W. Brown syndicate, Cleveland.
Chicago	Cargo stmr.	390	370	48	28	20, 33½, 55x40....	Two Scotch, 12-10x13....	Natural .....	170	5,250	230,000	W. W. Brown syndicate, Cleveland.
Chicago	Cargo stmr.	366	346	48	28	20, 33½, 55x40....	Two Scotch, 12-10x13....	Natural .....	170	4,800	220,000	W. W. Brown syndicate, Cleveland.
Chicago	Cargo stmr.	366	346	48	28	20, 33½, 55x40....	Two Scotch, 12-10x13....	Natural .....	170	4,800	220,000	W. W. Brown syndicate, Cleveland.
Chicago	Cargo stmr.	366	346	48	28	20, 33½, 55x40....	Two Scotch, 12-10x13....	Natural .....	170	4,800	220,000	W. W. Brown syndicate, Cleveland.
Cleveland	Cargo stmr.	374	354	48	28	20, 33½, 55x40....	Two Scotch, 14x12....	Natural .....	170	4,090	220,000	W. C. Richardson, Cleveland.
Superior	Cargo stmr.	366	346	48	28	20, 33½, 55x40....	Two Scotch, 12-10x13....	Natural .....	170	4,800	220,000	G. A. Tomlinson, Duluth.
Superior	Cargo stmr.	366	346	48	28	20, 33½, 55x40....	Two Scotch, 12-10x13....	Natural .....	170	4,800	220,000	F. Seither, Cleveland.
Lorain	Cargo stmr.	434	414	50	28	22, 35, 58x40....	Two Scotch, 13-2x11-6....	Ellis & Eaves..	170	6,200	260,000	Arthur Hawgood, Cleveland.
Bay City	Cargo stmr.	434	414	50	28	22, 35, 58x42....	Two Scotch, 13-2x11-6....	Ellis & Eaves..	170	6,200	260,000	H. A. Hawgood, Cleveland.
Bay City	Cargo stmr.	434	414	50	28	22, 35, 58x42....	Two Scotch, 13-2x11-6....	Ellis & Eaves..	170	6,200	260,000	W. A. Hawgood, Cleveland.
Detroit	Day pass. stmr.	308	300	37-6	13-6	33, 51, 82x72....	Five of cylindrical type.....	.....	.....	.....	275,000	White Star Line, Detroit.
Detroit	Pass. and frt. stmr.	366	350	55	19-6	.....	Eight Scotch .....	.....	.....	.....	640,000	Detroit & Buffalo Steamship Co.
Detroit	Pass. and frt. stmr.	366	350	55	19-6	.....	Eight Scotch .....	.....	.....	.....	640,000	Detroit & Buffalo Steamship Co.
											109,750	\$6,330,000

each, after being towed in sections through the Canadian canals and put together at Montreal; a steamer of about 3,000 tons capacity intended for salt-water service and building at Detroit for H. T. Morley of Detroit; steamer Yosemite, duplicate of the Colonel, which is nearing completion at Detroit; steamer Christopher, building at West Superior for Myer and others of Milwaukee, which is also nearing completion; and the Western line package freighter at Buffalo.

## THE GREAT ALGIERS FLOATING DRY DOCK.

The great floating dry dock which the Maryland Steel Co., Sparrow's Point, Md., has constructed for the United States government, is now awaiting the passing of the hurricane season in order to be towed to its station at Algiers, La. That will be about Oct. 1, and several powerful ocean-going tugs will convey the immense dock to its destination. This great piece of marine mechanism for lifting big ships out of the water is without a superior in its line. It can raise a 15,000-ton battleship and have the floor of the dock 2 ft. above the water, which is demanded by the government for its work, but with the floor even with the waterline it can lift an 18,000-ton ship.

The dock is 525 ft. in length over all, while its breadth is exactly 126 ft. 2.7 in. The width between the sides is 100 ft. The entire height of the sides, from their bottoms, which are submerged, to the tops, is 55 ft. The depth of the pontoons, or what the inexperienced might call the hulls of the dock, is 17 ft. 6 in. The greatest draught of the dock is 49 ft. 6 in. There are three pontoons, which form its floor, and also, with the sides, give it buoyancy. The middle pontoon is the largest, being 242 ft. long, and the end pontoons are each 141 ft. ¾ in. in length. The walls are 395 ft. ¾ in. long and are 9 ft. in width at the top and 13 ft. at the bottom. The pontoons and sides are divided into forty water tight compartments, which enable the dock to be completely under the control of the dock master, who can make it assume any position required to dock a vessel. It has 261 keel blocks, upon which the vessel rests in the dock, and they are movable, so that they can be readily adjusted. The weight of the steel in the dock is 5,865 tons, and the weight of the dock equipment is 1,000 tons, making a total weight of 6,865 tons. The cost of the dock complete is \$810,000.

The stability of the structure, according to the engineer's figures, is something remarkable. Carrying a 15,000-ton battleship 2 ft. above the water, it will cause her stability to be fifteen or twenty times as great as that of a ship in the water. The numerous compartments add to the steadiness of the dock, for, if they were few in number, the water in them when

feet and inches, so that the beam of the vessel being known the shores on one side can be adjusted to the proper length, the vessel is then run into the dock and set against the two shores so adjusted, after which the other two shores are pushed up against her, holding her firmly in position. This is done before the vessel is lifted. If a craft should be listed the compartments on one side of the dock are emptied sufficiently to enable her to enter the dock parallel with its sides. She is then adjusted in position by means of the shores, and the dock is lifted to an upright position and the vessel also assumes the same attitude. The dock has adjustable bilge blocks and keel blocks, which can be concentrated if required for small vessels. The engines and pumps are in the side walls, from the tops of which the smokestacks project. Should a ship draw 1 or 2 ft. more of water than the capacity of the dock as stated the structure could be made to float with the deck awash, and the tops of the walls are ordinarily sufficiently high above the water to permit the dock to be sunk the additional distance necessary to take in the craft.

Another feature of this dock is the fact that she is able to dock herself for cleaning and painting. The three pontoons are connected with the sides by means of joints that are bolted together. There are two sets of these joints, one above and one below. Supposing it to be necessary to clean and paint the bottom of the center pontoon, the joints are disconnected so as to release it from the side walls. Then the two other pontoons and the walls are sunk until the lower joints of the center pontoon are on a level with its upper joints in the side walls. The lower joints of the center pontoon are coupled with the upper joints in the side walls, after which the water is pumped out of the other pontoons, and the whole structure is thus raised until the center pontoon stands away up out of the water, and it can then be easily cleaned and painted. The bottoms of the side walls can be reached by pumping all the water out of the compartments on the side of the dock which it is desired to raise and then filling those on the other side. The result of this is to list the dock so that one side of it stands clear out of water. Had the dock not been so made it could not have been cleaned, for the reason that there is no other dock large enough to hold her.

The dock is furnished with electric lights, water supply, etc., and has comfortable accommodations for eight men. When it reaches its destination at Algiers, La., it will be moored to the shore by heavy cables, and from the openings in the walls large booms will form connection with the shore. The pointed ends of the forward and rear pontoons will cause the dock to be little affected by the current. Work is now being done at Algiers, sinking steel columns for the booms and preparing wharf facilities. In repairing ships materials are conveyed to them through the openings in the dock walls.



### PROGRESS OF CLERGUE ENTERPRISES AT THE SAULT.

Sault Ste. Marie, Ont., Aug. 28.—At Sault Ste. Marie eight dredges are working steadily on an approach and channel for the large ore receiving and shipping dock the Clergue companies are to put in. These docks will be above the Canadian lock about a mile and near the site of the charcoal furnaces and initial steel plant, now nearly ready for operation. A site has been chosen further up the shore, at the long point that sweeps out into the St. Mary's river, for the proposed additions to the steel-making capacity of the company. This will be improved later. So much have these dredges stirred up the water above the rapids that a mild epi-

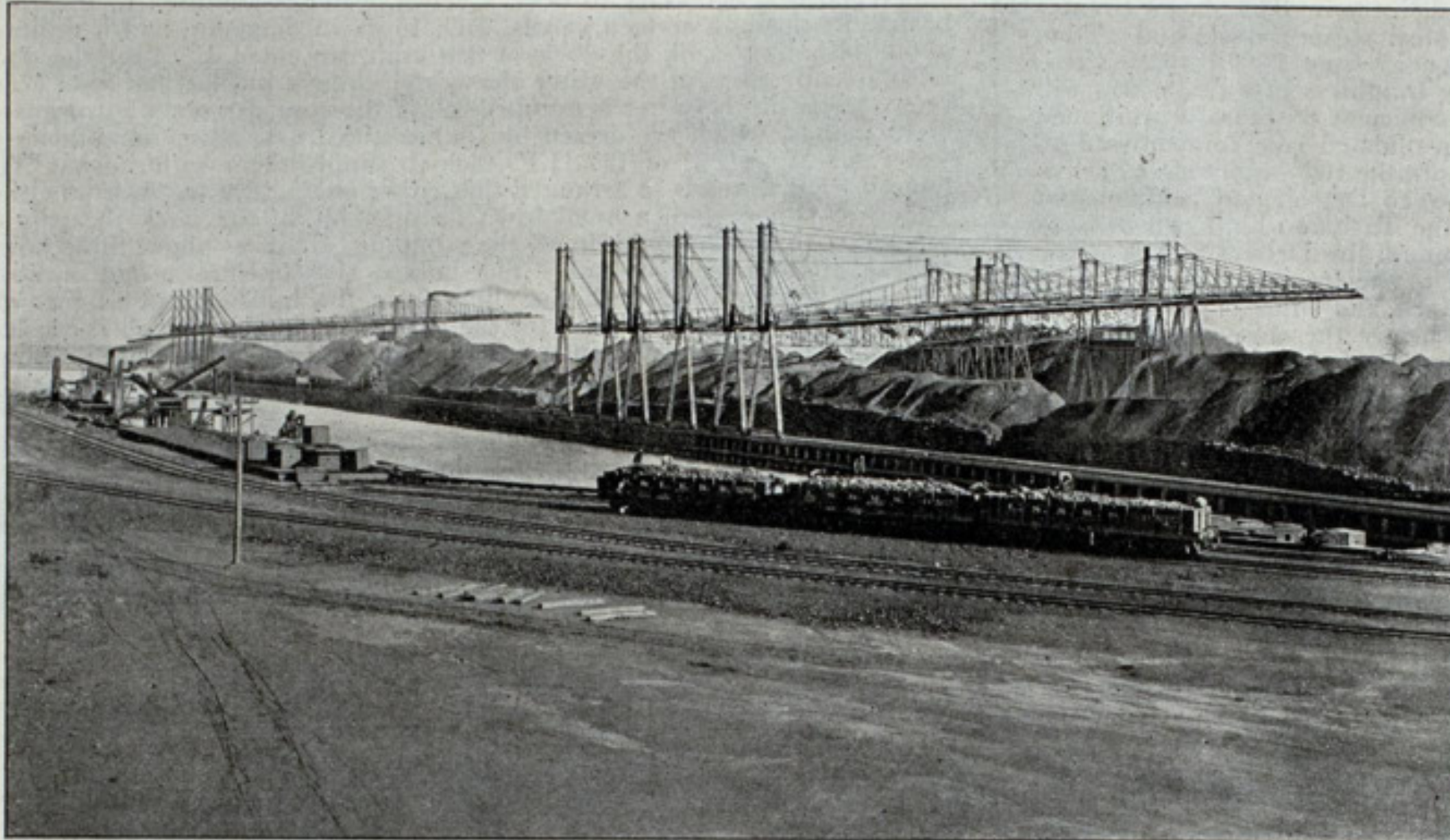
depend upon these settlers for this wood, thus giving them a cash market and aiding settlement. A "demonstration plant" for the carbonizing of wood by the process owned by a New Yorker, has been completed and if found suitable will be extended to a size sufficient for all the fuel required. The plant now ready is one unit of the large installation that will be needed later. Coking contracts of importance are also being closed.

Steel ore cars of 50 tons capacity are being constantly received for the Helen mine railway and are forwarded to the mine by shipload. These cars are now stencilled "Algoma Central & Hudson Bay Railway," as is all the newer rolling stock of the company. The main line of road northward from the Sault is being steadily pushed northward, and is expected

to make a connection this winter with the Helen mine, 100 miles north, so that ore can be brought down at any season to the works at the Sault. The Helen mine road itself is being pushed northeasterly to the new Josephine mine and to a connection with the main line at the point where surveys show the junction. Work has commenced at the Josephine mine and that property is expected to make some shipment next year. A careful sampling of the Helen is showing a better grade of ore than had been anticipated and it looks as though careful mining, such as can be carried forward when the property is more fully opened, may furnish a bessemer grade.

With the approaching completion of the American canal and the drain upon Lake Superior that will thereafter result, it was necessary to hasten the work upon the proposed regulation dam across the Sault rapids. This dam has been under way for a month and the concrete piers are about completed for a fourth of the width of the river. The dam follows the line of the Canadian Pacific's international bridge. The concrete piers are closely spaced and will be connected by steel shutters, etc., that will regulate the flow of the stream. This dam will be completed by the time the American canal is ready for water. Instantly the flow over the rapids will be greatly reduced. With the additional drain that will come with the second Canadian power canal the flow over the old channels will be nearly dried up, and the rapids will be a mere memory.

The company's railway projects east of the Sault, in the Sudbury country, are progressing, and there are now several pyrrhotite mines there in preliminary operation for this concern. Additional mineral lands in all portions of the Algoma territory, and elsewhere in convenient localities and under the company's grants, are being looked over and taken with a



VIEW OF BROWN STANDARD BRIDGE TRAMWAY PLANT AT ASHTABULA, O.

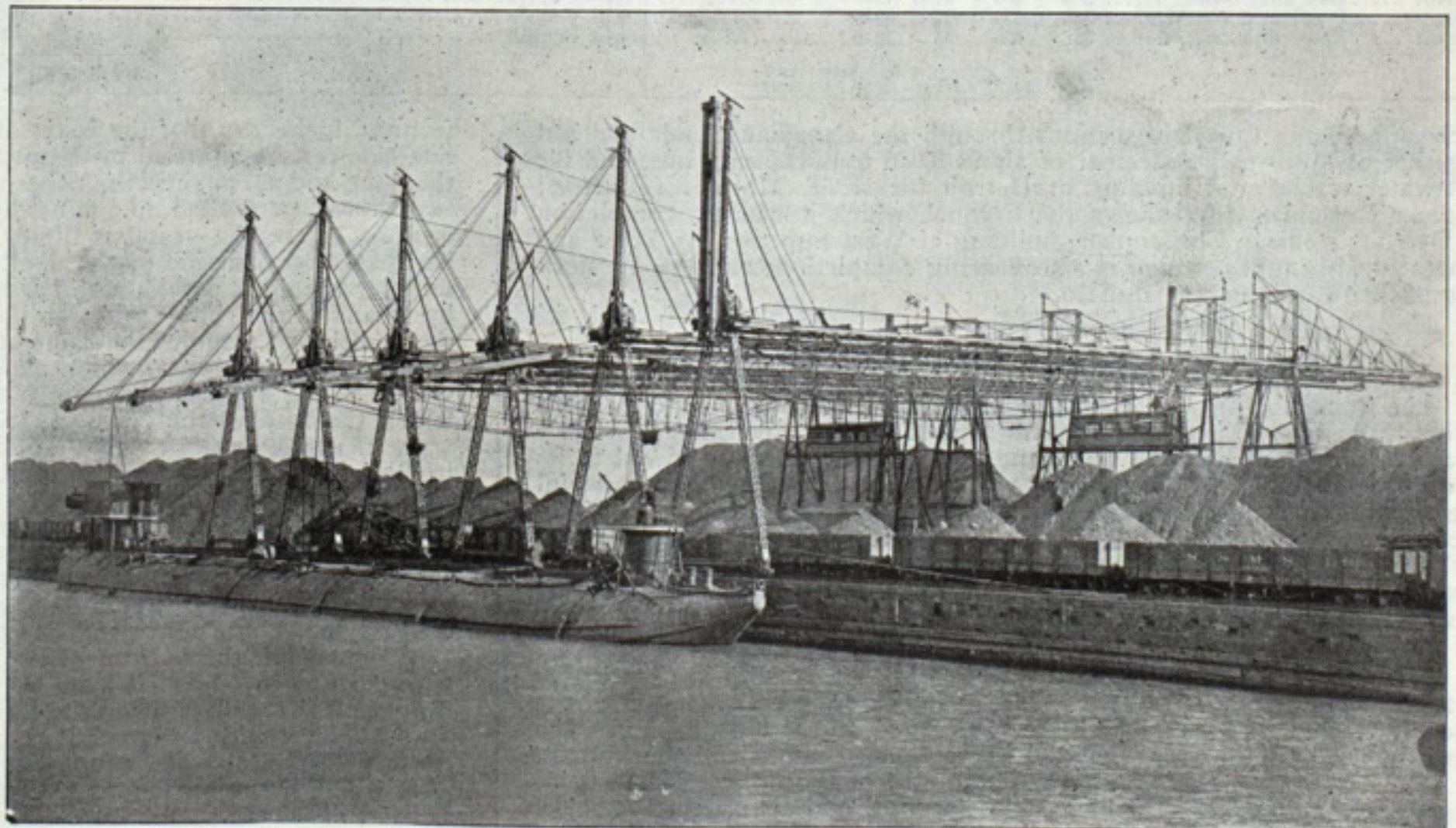
demic of typhoid fever exists there at the present time. But sewerage is being installed and water will be put through the town, all under the directing genius of Mr. Clergue, so that very soon this difficulty is expected to disappear.

The great power canal of the Michigan Lake Superior Power Co. on the American side of the rapids is about completed so far as the excavation is concerned, though it will take a long time to clean up the bottom, line the sides of the canal for the lessening of friction, cut out the ends that now hold the water back, and complete the power house.

It is expected that the turbines will be started up some time next summer. Work on the mammoth power house is progressing very fast. The foundations are all in, the steel work has risen one story, the steel and masonry receiving chambers are nearly all done and the turbines are being placed very fast. A number of them are already in and ready, while many more are on the ground. Each is expected to develop more than 600 H. P. They are Stillwell-Bierce, Jolly-McCormick wheels. Excavation is done for the wide forebay—1,400 ft. across at the power house end—and the sides are being lined with timber and masonry. The power house is the largest steel job under process of construction in America today, there being more than 6,000 tons of structural material in the building. To aid in this construction six traveling derricks are placed upon tracks on the top of the steel work and are in constant use. In addition to them hydraulic riveters, etc., are in constant occupation. The masonry curtain of this building along the river front is up one story and will be pushed up as fast as the three remaining stories of steel work can be raised.

Excavation for the third canal (the second upon the Canadian side) is well started and will be pushed, as there is need of rock to be taken therefrom. This rock is going into the various buildings under way about the chemical end of the works, into walls of the steel mills, etc.

The steel mills will be in operation, rolling about 500 tons daily, in two or three months. The foundations for two charcoal furnaces of 150 tons daily capacity each are in and the superstructure is rising as rapidly as the material can be brought and put in place. A contract for half the wood required for these furnaces has been let and men are now arriving from Nova Scotia to cut it. This will amount to 300 cords daily for a year, and will doubtless be renewed at the close of the period. Another contract will be let if Mr. Clergue is unable to secure from settlers along his road the additional wood required. It is his ultimate intention to



A WHALEBACK VESSEL UNDER THE HOISTS, ASHTABULA, O.

systematic thoroughness and with the utmost speed consistent with care and exactitude.

These and other developments are progressing as fast as possible. It means a vast expenditure and an enormous machinery of organization. This organization reaches far beyond the limits of the Sault and the immediately surrounding region, and if it could be laid bare would present a magnificent example of heroic activity and foresight. Mr. Clergue is not building for the immediate future, vast as that is, but for a very considerable period, and as time progresses and the foundations laid far down are built upon and results come into view the work now being carried forward will assume its true importance and its real connection with the scheme of Canada's advance and development.



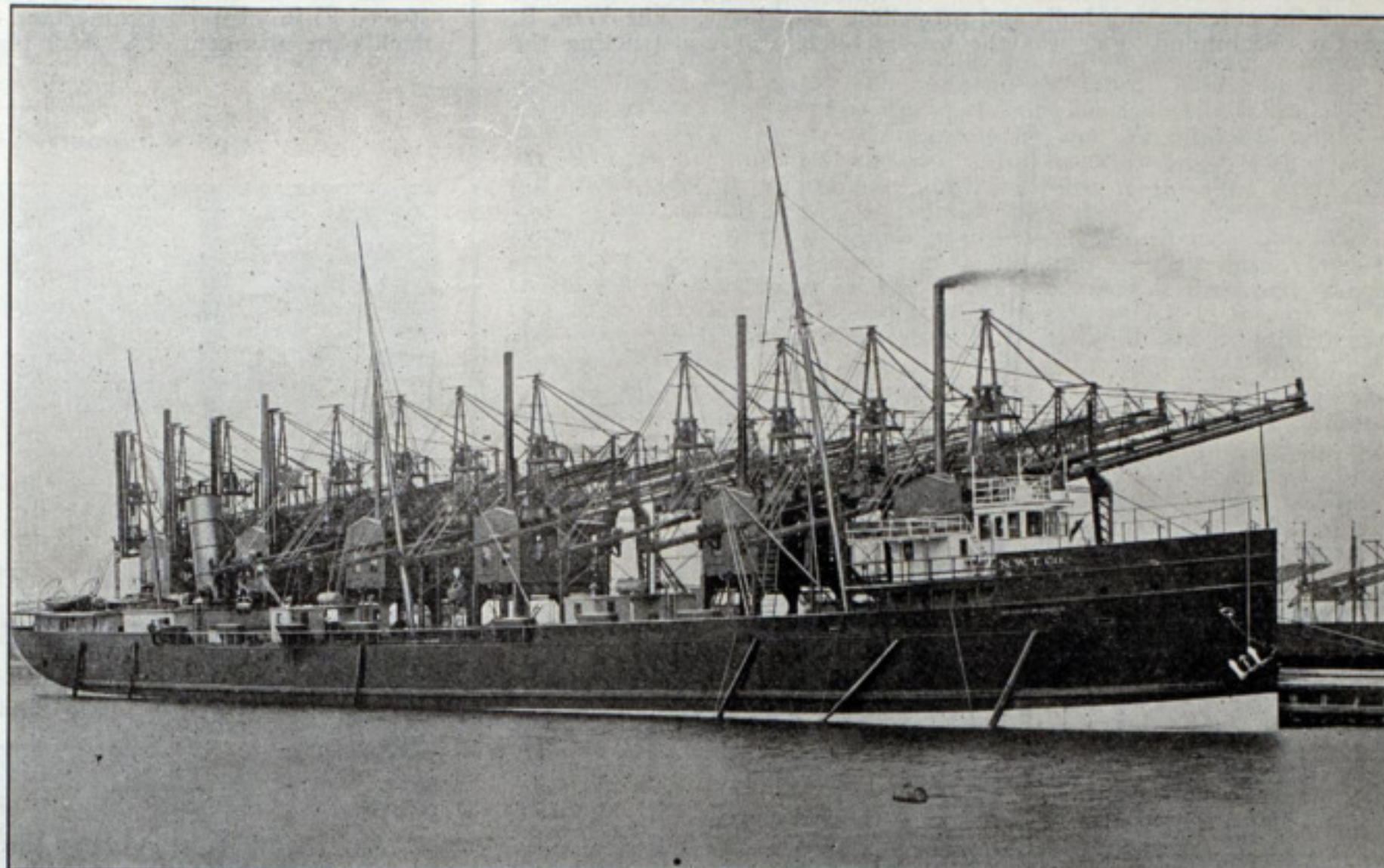
### VOUCHERS FOR ARMOR PLATE ROYALTY WITHHELD.

Acting Attorney-General Beck has advised the secretary of the navy that he is justified in withholding approval of certain vouchers which have been submitted by the Bethlehem Steel Co. and the Carnegie Steel Co. for royalties which these companies paid for the use of the Harvey process in hardening steel and for which they claim reimbursement from the government under a contract by which the government agreed to repay these royalties if the steel companies were "required to pay" them to the Harvey interests. The government's liability has been a matter of dispute for some years and while these particular royalties only relate to the armor plates for the battleships Illinois and Wisconsin the decision affects all of the royalties on the various battleships which have been constructed since 1893 or under process of construction. The opinion of the acting attorney general contains a full statement of the contract relations between the government and the contractors.

It sets forth that on April 12, 1893, the government made a contract with the Harvey Steel Co. by which it acquired the right to use the inventions described by paying a royalty of one-half of one cent, a pound on the finished plates. Later, Admiral Sampson, then chief of the bureau of ordnance, advised the navy department that no further royalties should be paid, as the steel used by the government through its contractors in the construction of armor plate was not the same as that covered by the Harvey patents, and for the additional reason that the Harvey patents were invalid for want of novelty. On this recommendation Secretary Herbert in 1895 refused to pay further royalties. In 1897 the two steel companies took out a license from the Harvey Steel Co. to use its process in the face-hardening of armor plates. The contract stipulated that they were under no obligation to pay any royalties whenever the Harvey Steel Co. had previously granted a license to any government and the royalties provided by said license had in fact been paid by such government. The agreement further stipulated that the steel companies should submit to an adverse decree for an alleged infringement of the Harvey patents and the issuance of an injunction to restrain them from the

consin to the Harvey Steel Co., presented a voucher for the approval of the secretary of the navy to secure reimbursement, and the secretary requested the opinion of the attorney general as to whether he was justified in withholding his approval until the case in the court of claims involving the validity of the Harvey patents was first determined.

Acting Attorney General Beck, in the opinion just sent to the secretary of the navy, advised him that he is justified in withholding such approval, saying: "The government contends that the process employed in hardening the armor plates is not covered by the Harvey patents; and



IRON ORE CARRIER DISCHARGING CARGO.

Copyright, 1900, by Brown Hoisting Machinery Co.

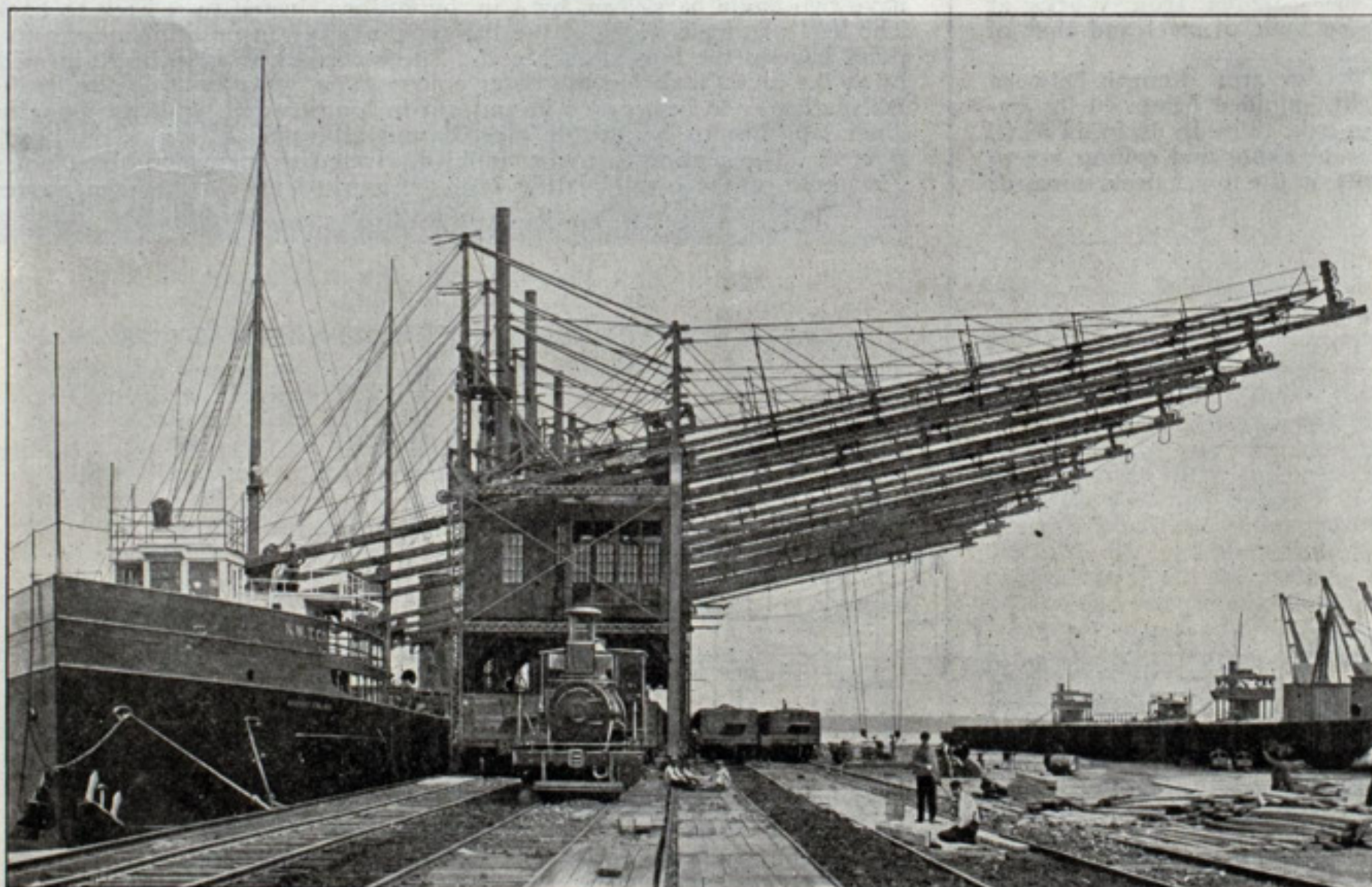
in the second place, that the patents are invalid. If the only question were as to the validity of the patents, it could be urged with some force that by the license of March 24, 1897, the Carnegie company is estopped from disputing the validity of the Harvey patents, and is, therefore, 'required' to pay these royalties. It is not necessary to decide this question at this time; for if the first contention of the government be sound and the process used

by the Carnegie company in hardening these plates is not the process covered by the Harvey patents, then it would not be the subject of the agreement of March 24, 1897, and the Carnegie company was not 'required' to pay royalties thereunder. It is evident that the government desires to have the question of the validity of the Harvey patents and the exact process covered by them, judicially determined, and it should not be defeated in this purpose by the ingenious agreement into which its contractors and the Harvey company entered."

### COLORADO FUEL & IRON CO. —ANNUAL MEETING.

At the annual meeting of the stockholders of the Colorado Fuel & Iron Co., held at Denver, Col., last week, Ben T. Cable, J. T. Kebler and Ernest Thalman retired from the board of directors and the following were elected to fill the vacancies: J. J. Mitchell, James A. Blair, John Lambert and John W. Gates. Henry R. Wolcott retired from the board, owing to his protracted absence from Denver. J. C. Osgood was elected chairman of the board; James A. Kepler, president; A. C. Cass, first vice-president; D. Sullivan, second vice-president, and J. E. Heimerdinger, third vice-president. The executive committee issued a statement to the effect that the control of the company had not passed to eastern

men, as evidenced by the election of a majority of directors from Denver. The usual quarterly dividend of  $1\frac{3}{4}$  per cent. on the preferred stock was declared. The dividend preceding this one was the first paid since the discontinuance of common dividends in 1893, when  $1\frac{1}{4}$  per cent. was paid. The last two dividends are each  $1\frac{3}{4}$  per cent., declared quarterly, so the common stock is now on a 7 per cent. annual basis. In 1900 the company paid 40 per cent. on the preferred, completely wiping out the accumulated back dividends. The full dividend for 1901 has been paid. The first of six blast furnaces to be erected after modern plans at the Pueblo plant is now completed.



LOCOMOTIVE PULLING OUT LOADED CARS.

Copyright, 1900, by Brown Hoisting Machinery Co.

This plant is capable of unloading a vessel of 5000 tons capacity in a single day. Built by Brown Hoisting Mach. Co., Cleveland.

use of the process except under this license. Suit was begun in a United States circuit court and a decree entered as stipulated in the agreement.

Later the two steel companies, in 1898, made contracts with the government for the manufacture of armor plate for the battleships Illinois and Wisconsin, which provided that if the steel companies were "required to pay" royalty for the use of the face-hardening process, the government should reimburse them. The Harvey Steel Co. then brought suit against the government in the court of claims for an infringement of the patents, and the government defended on the grounds indicated by Secretary Herbert. The Bethlehem Steel Co. and the Carnegie Steel Co., having paid the royalties for hardening the armor plate of the Illinois and Wis-



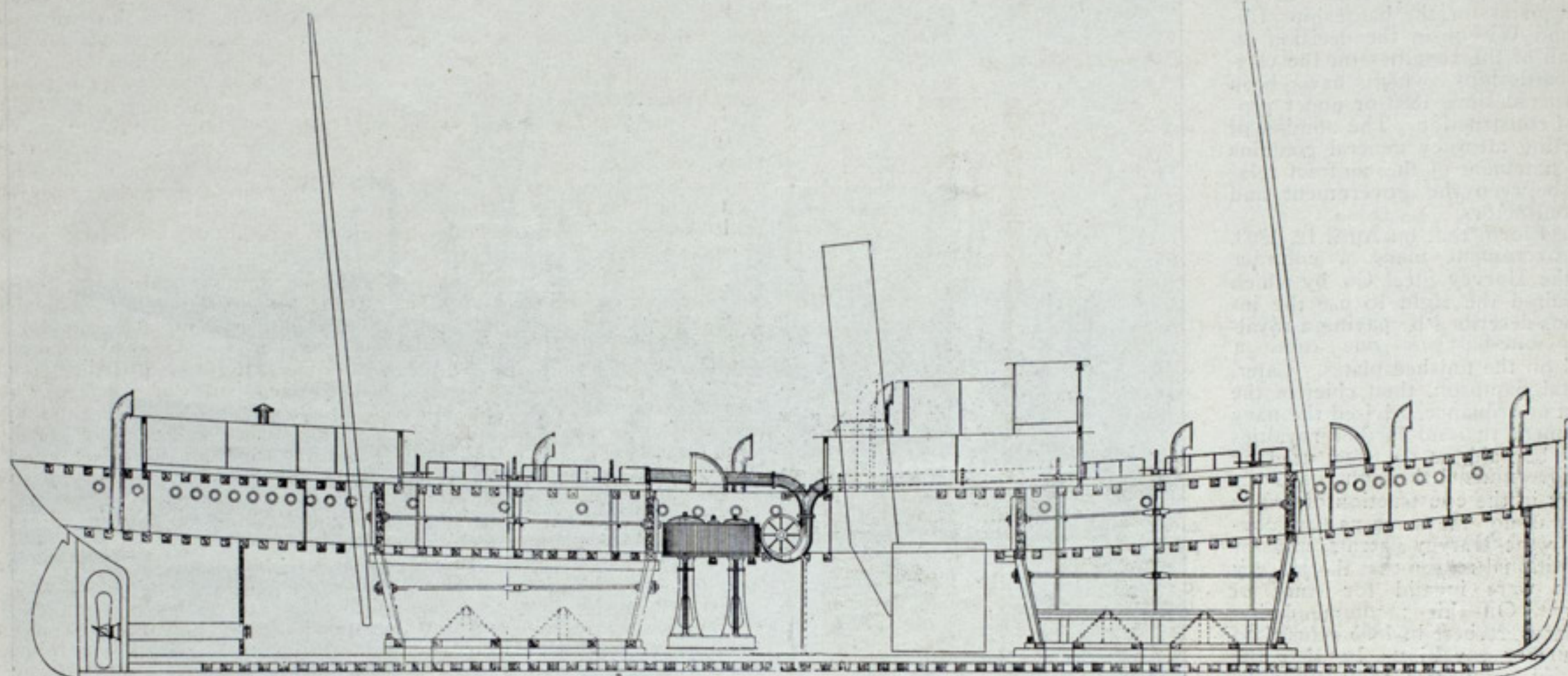
## TWO SEA-GOING SUCTION DREDGES.

THE GOVERNMENT ENGINEER AT CHARLESTON, S. C., OPENED BIDS FOR THEM  
—A GENERAL DESCRIPTION OF POWERFUL MACHINES.

Capt. J. C. Sanford, government engineer at Charleston, S. C., recently opened bids for the construction of two sea-going suction dredges—one for the Southwest pass and the other for Cumberland sound. There were quite a number of bidders—both for installing the pumping machinery and for constructing hulls and propelling machinery. The Wm. R. Trigg Co., Richmond, Va., was the lowest bidder for constructing the

minute. The number of revolutions of the discs of these pumps should be between 200 and 250 per minute. The dredge is to be equipped also with two steam hoisters, Lidgerwood, Williamson or any other kind equally good.

The hull, as well as the bins, of the Southwest pass dredge are to be of steel. Following are the dimensions of the dredge: Length between perpendiculars, 260 ft.; length over all, 271½ ft.; molded beam, 47½ ft.; molded depth, 23 ft. The frames are to be of bulb angles, 6 in. by 13 in. by 19 lbs. from frame No. 27 to frame No. 112. The remaining frames are to be bulb angles, 6 in. by 3 in. by 17 lbs. They are to be spaced 24 in. center to center and to be in one piece from midship line to deck plate stringer. The floor plates are to be 26 in. deep at center line

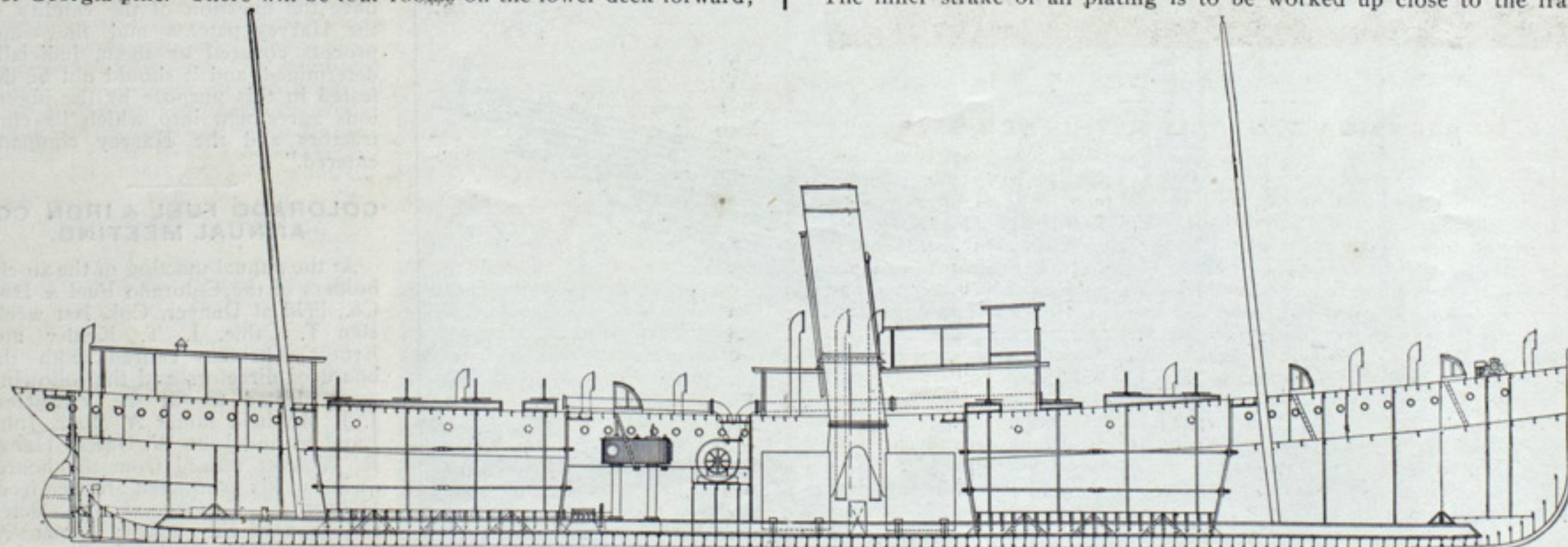


LONGITUDINAL SECTION OF SUCTION DREDGE FOR CUMBERLAND SOUND.

hull and machinery of the Cumberland sound dredge, having bid \$263,952. Their bid for the pumping machinery was \$32,050. The Petersburg Iron Works Co., Petersburg, Va., bid \$293,980, including pumps, or \$283,540 without pumps. The lowest bidder for constructing hull and machinery of the Southwest pass dredge was George A. Gilchrist, Belfast, Me., who bid \$124,250. He made no bid on pumps. The Petersburg Iron Works Co. bid \$141,950 for the dredge complete, including pumps. The lowest independent bid for pumps was that of the Camden Iron Works at \$20,225. The Southwest pass dredge is to be built of steel and that of Cumberland sound of wood.

Dimensions of the Cumberland sound dredge are: Length between perpendiculars, 185 ft.; length over all, 200 ft.; molded beam, 40 ft.; extreme beam, 40 ft. 10 in. The keel is to be of oak, 12 in. by 14 in. in 50 ft. lengths. The frames are to be of oak. The planking and ceiling are to be of Georgia pine. There will be four rooms on the lower deck forward;

and 5½ in. thick. The center continuous intercostal keelson plate is to be 56 in. wide and 5½ in. thick, and to extend above floors 30 in. There will be a continuous floor stringer plate on each side of the keelson plate, 20 in. wide, 26 lbs. to 20 lbs. at ends. Two angle bars, 6 in. by 4 in. by 20 lbs., are to be riveted to this plate and to keelson plate. Each intercostal plate is to be riveted to inner keel plate between floors by two angle bars, 6 in. by 4 in. by 20 lbs. The top of the keelson plate is to have two angle bars, 6 in. by 4 in. by 20 lbs., riveted to it back to back. The keel plating is to be of the flat type, worked in two thicknesses to a point beyond the bins at each end. The inner course is to be 30 in. wide by 26 lbs. to 20 lbs., and the outer course 48 in. wide by 36 lbs. to 30 lbs. All plating is to be worked in and out in longitudinal strakes. Longitudinal laps are to be double riveted and all vertical butts to be treble riveted. The plating is to be doubled, riveted to stem and stern posts. The inner strake of all plating is to be worked up close to the frames.



LONGITUDINAL SECTION OF SUCTION DREDGE FOR SOUTHWEST PASS.

also one toilet and one store room and lamp locker. The propelling engine is to be of the fore-and-aft, vertical, inverted, compound condensing type, with cylinders of 22 and 44 in. diameter and 30 in. stroke. The vessel is to be equipped with two boilers of the Scotch return tubular type, 14 ft. diameter and 12 ft. long. The pumping engines are to be two in number, direct connected to the 18-in. sand pumps. The type of engine is to be vertical, inverted compound condensing, with cylinders 14 in. and 26 in. and a stroke 18 in. The dredging pump is to be 18 in. of centrifugal type, and extra heavy construction, especially adapted for dredging. The pump runner is to be of the open side type, having four blades curved to a uniform radius. The blades are to be covered with renewable steel plates for their entire working surface. The pumps are to be capable of raising and discharging against a head of 14 ft. 85 cubic yards per minute. When working in good material and in water 32 ft. deep each should lift from the bottom and should discharge into the bins 10 cubic yards per

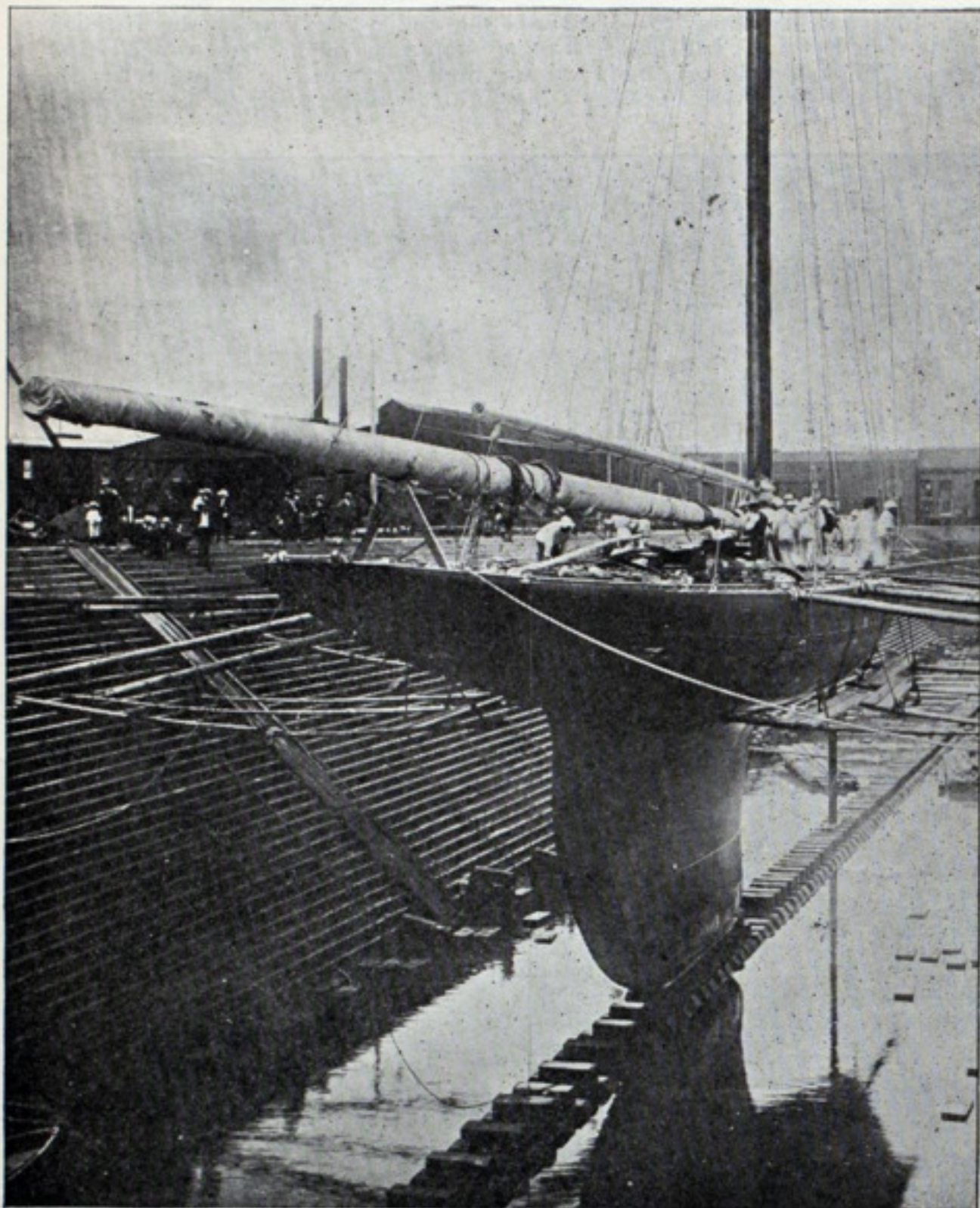
The dredge will be equipped with a water-tight collision bulkhead on frame No. 11 and one on frame No. 118, and is to have a Williamson steam steering engine and Hyde steam capstan and windlass. The dredge is to contain two sand bins, the forward bin starting on frame No. 31 and extending to frame No. 51, and the after bin starting on frame No. 88 and extending to frame No. 108. The uprights or studs for bins are to be bulb angles, 5 in. by 3 in. by 12.1 lbs., spaced 24 in. center to center. There are to be three bulb angle braces on every stud on sides, 5 in. by 2½ in. by 10 lbs., riveted to 17½ lbs. gusset plate on stud and frame. At the bottom of each stud there will be 17½ lbs. gusset plate riveted to stud and floor plate stringer. Intercostal plate of 5½ in. will be riveted to floor plates and to bottom plating by angle bars 3½ in. by 3½ in. by 8½ lbs. This intercostal plate will extend fore and aft under bins at the gate openings. This dredge is also to be equipped with a machine shop.

The propelling machinery will consist of two fore and aft vertical



inverted, compound condensing engines, with cylinders of 20 and 40 in. by 30 in. stroke. All pumps are to be independent. There will be four boilers of the Scotch return tubular type, 13 ft. 6 in. in diameter and 12 ft. long. The dredge is to have a complete electric lighting plant. The pumping engines, two in number, are to be of the vertical, inverted, compound condensing type, with cylinders of 16 in. and 32 in. diameter by 20 in. stroke, and are to be direct connected to the 20-in. sand pumps. The dredging pumps are to be of the centrifugal type, of extra heavy construction and suitable shape, especially adapted for dredging, with 20-in. suction. The pump runner is to be of the open side type, having four blades curved to a uniform radius. These pumps are to be capable of raising and discharging against a head of 16 ft., 95 cubic yards of water per minute. The number of revolutions of the disc of these pumps while dredging is to be between 200 and 220 per minute.

#### “The Contestant for the America’s Cup.”



SHAMROCK II IN DRY DOCK, SHOWING HER KEEL.

#### J. P. MORGAN NOW CONTROLS BETHLEHEM STEEL.

Settlement was made on Monday for the Bethlehem Steel Co. stock which Charles M. Schwab was under commitment to pay. The number of shares settled for was 168,000 and the amount paid \$4,032,000. The operation was financed by J. P. Morgan & Co. through Drexel & Co., who paid the amount to the Girard Trust Co., which will distribute it pro rata among the sellers. The balance of the stock deposited with the Girard Trust Co. will be paid for in thirty days. It is understood that the time for depositing the stock will be extended to Sept. 26. Immediately after the settlement the directors of the Bethlehem Steel Co. met and reorganized, five new men being elected. The board consists of Edward M. McIlvain, Robert P. Linderman, E. T. Stotesbury, Archibald Johnston, George F. Baer, J. P. Ord and Charles MacVeagh. Mr. McIlvain was elected president; A. E. Borle, vice-president; H. S. Snyder, secretary; A. L. Cleaver, treasurer, and Archibald Johnson, general superintendent. Control of the Bethlehem Steel Co. now rests with J. P. Morgan & Co., but it is understood that it will not be taken into the Steel Corporation. Its future is for the present indefinite.

The Sharon Steel Co. has let contracts for the erection of ten sheet mills and four additional open hearth furnaces. These additions will necessitate the expenditure of something like \$1,000,000, which, with the plants already in operation or in course of construction, will represent an investment of more than \$8,000,000. The new sheet mills will have a capacity of 100 tons per day, which will bring the total average daily finishing capacity of the Sharon Co.'s works up to 900 tons per day. Contracts for the erection of the buildings have been let to the American Bridge Co.

The new North German Lloyd steamship Kronprinz Wilhelm, built by the Vulcan Ship Building Co., Stettin, Germany, made a preliminary trial trip on the Baltic this week, developing 27,000 H.P. Her engines ran at about three-quarters speed and worked smoothly. The Kronprinz Wilhelm is designed to be a fraction of a knot faster than the Hamburg-American liner Deutschland, which holds the record across seas. She is scheduled to sail from Bremen on Sept. 17 and from Southampton and Cherbourg the next day.

#### PEN SKETCH OF J. PIERPONT MORGAN.

Go to the corner of Broad and Wall streets, New York, climb ten steps on the southeast corner, enter a large counting-room, and in a long office behind glass partitions, with wide-open doors which are never closed, you see between 10 a. m. and 3 p. m. J. Pierpont Morgan, either seated at the big desk or walking nervously up and down, usually with a cigar in his mouth and his hands in his pockets, says a writer in the Chicago Chronicle. His clothes are English in cut and sometimes loud in design. He has the shoulders and waist of a pugilist; a clean shaven chin, with lips that close like a steel trap. He is no exception to the rule that masterful men in the world's history have always had big noses. He has iron-gray hair, rather thin at the top of his head, a moustache lightly tinged with gray, and tremendous hands, which he uses with unusual grace. But there is one feature of his face which has not been mentioned. It will never be forgotten by any one who has talked with Mr. Morgan five minutes—his eyes. They are very large, with overhanging brows, and the pupils have the rare color of polished steel. When there is any feeling or passion behind them they take all the colors of a chameleon. No one has seen a pair of eyes like them. They dart fire, they blaze with passion, or they glow like iron at white heat. They have the power of penetration of the X-ray. A railroad president once said that when Mr. Morgan looked at him intently he felt as though his flesh and bones were transparent, while his very soul was laid bare to Mr. Morgan's eyes.

Mr. Morgan has never been a wrecker. On the contrary he has always been a builder up of fabulous fortunes for himself and his associates in the street. Mr. Morgan always evinced the greatest contempt for the late Jay Gould. He never employs a "wrecker." A student of atavism might wonder from what remote world-conquering ancestor Morgan derives his wonderful personality. His sternness and austerity may well come from a line of Puritan Morgans which reaches back for nearly three centuries. He was born at Hartford, Conn., April 13, 1837, was educated at a high school in Boston, and finished his schooling by three years at Göttingen, Germany. His father, Junius Spencer Morgan, was a great banker and a good man, the partner in many philanthropic enterprises of George Peabody in London. Morgan's father made him, after his return from the German school, the junior partner in the banking firm of Dabney, Morgan & Co. An older man was put at the head of the firm as a check upon the impetuous, domineering will of young Morgan.

At the age of thirty-two Morgan defeated Jay Gould in a contest for the control of the Albany & Susquehanna Railroad, and from that day all Wall street wreckers, except Gould, have felt in the presence of Morgan those sensations ancient Greeks felt in the presence of the oracle at Delphi. His work as a railroad reorganizer has given him among railroad men a reputation such as Moses may have enjoyed among the Israelites, and, like Moses, he holds himself above and beyond the men whom he leads. No one but himself can approximately estimate Mr. Morgan's wealth, and probably he could not guess within a million of the true figure. At sixty-two Mr. Morgan has probably amassed nearly as large a fortune as the late Jay Gould, and it is mounting very rapidly in these days, for besides his railroads he has a controlling interest in many other corporations. There is not a clerk in his employ who is not in occasional personal contact with Mr. Morgan, and he knows the minutest detail of every clerk's business better than the clerk himself.

#### A REMARKABLE NAVAL COINCIDENCE.

It is perhaps not generally known that the Confederate privateer Sumter, which Semmes commanded before he became captain of the Alabama, and which for a time was a terror to merchantmen, was built in Philadelphia. She came originally from the ship yard of Birely & Lynn, after models made by John W. Lynn, and her machinery was constructed by Reanie, Neafie & Co. She was called the Habana when she was launched several years before the opening of the war, and was noted for her swiftness, having made a record in the Delaware river of sixteen miles in fifty-eight minutes. She was built for James McConnell & Co., of New Orleans, in the Cuban trade, and soon after the civil war broke out she attracted wide attention by her operations as a privateer, which, however, were entirely eclipsed by those of the Alabama.

When the Alabama was built in the ship yards of the Messrs. Laird at Birkenhead she was known as "290," which was her number in the list of vessels there constructed. As "290" she was allowed to escape on the high seas and proceed to the Azores, and it was not until she was turned over to the command of Raphael Semmes, in the summer of 1862, that she was christened the Alabama. In all the correspondence and negotiations over the attempts to prevent her from leaving English jurisdiction she was described as "290."

More than a generation afterwards a curious coincidence happened in Philadelphia. Under the second administration of Mr. Cleveland the navy department was managed by Hilary A. Herbert of Alabama as secretary, and the duty devolved upon him of giving a name to one of the battleships which the Cramps of Philadelphia, contracted to build and which only a short time ago went into commission among the most formidable fighting ships of modern times. Secretary Herbert decided to give the vessel when she was launched the name of the state he had long conspicuously represented in congress, although there was some expression of opinion at the time as to whether it was exactly proper to revive thus the name of a craft which had been associated with all that was most destructive in the Confederate navy next to the Merrimac, and which many northerners had once regarded as an odious pirate. These objections, however, were few, and they gave way to the sentiment of sectional reconciliation. But when she was called the Alabama the Cramps looked at their books and there, unknown to Mr. Herbert, it was found that she too was set down as "No. 290."—Philadelphia Evening Bulletin.

The company with which Mr. Lyman C. Smith of Syracuse, N. Y., and Capt. W. W. Brown of Cleveland are identified and which has five vessels under construction in the yards of the American Ship Building Co. (consolidated lake yards), has been incorporated at Newark, N. J., under the name of the United States Transportation Co. The company is capitalized at \$1,200,000, divided into shares of \$100 each.



## FRUIT TRADE—GREAT BRITAIN AND JAMAICA.

**ELDER, DEMPSTER & CO. HAVE SUCCEEDED IN BUILDING UP AN ADMIRABLE TRADE WITH THE ISLANDS.**

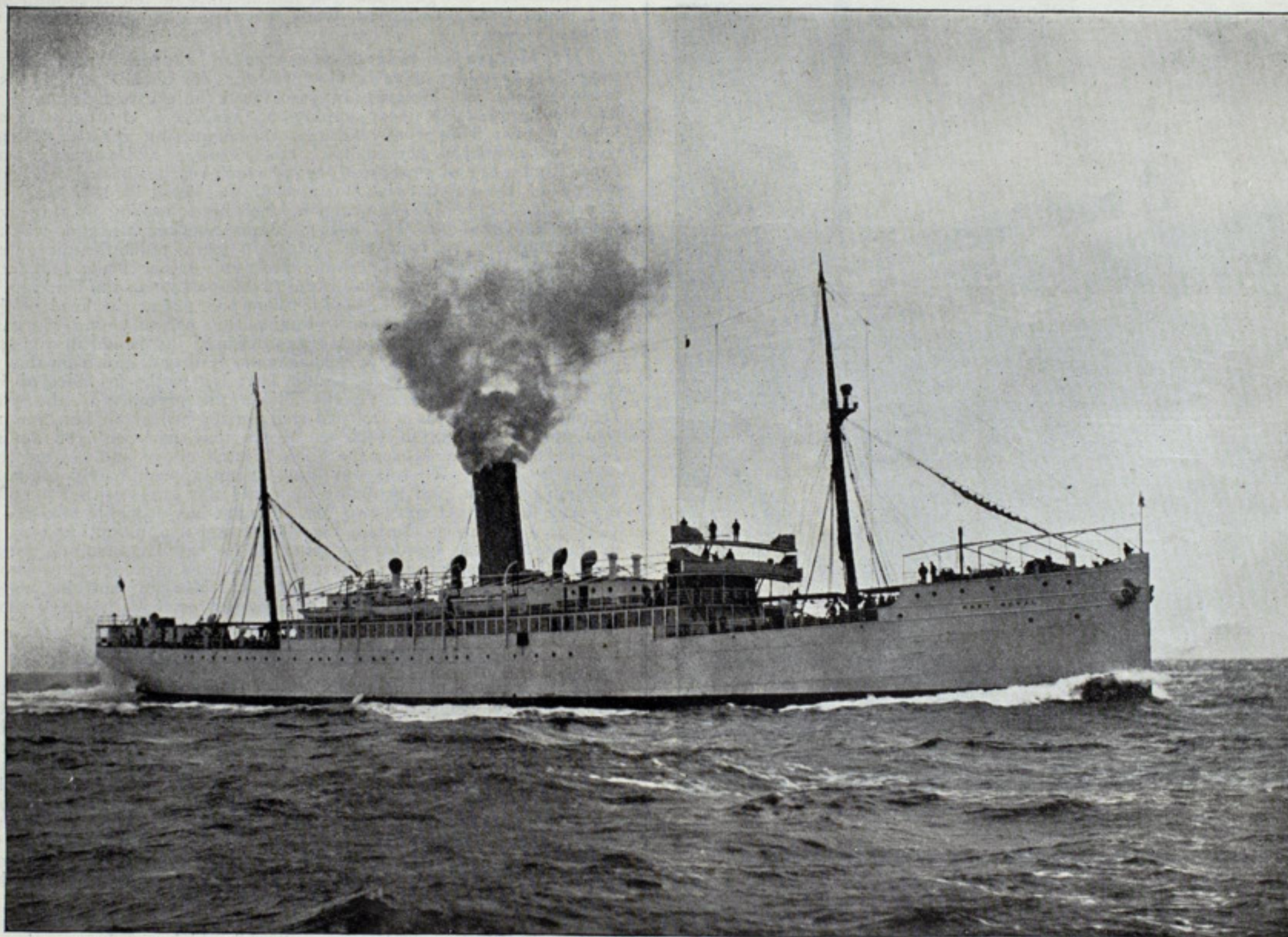
It will probably not be questioned by anyone—at least not by anyone in Great Britain—that the trade with Jamaica has been developed through the enterprise of Elder, Dempster & Co. This company inaugurated a mail service between Great Britain and its West Indian colony at a time when almost everyone was of the opinion that such a service could only be carried on at a loss, there being seemingly very little outward cargo and of homeward cargo none at all. No sooner had the mail service been established than the guiding spirit of the company, Mr. A. L. Jones, set about to create trade with Jamaica. That he has succeeded is evidenced by the splendid line of steamships which now ply between Kingston and Avonmouth. Among the things which the company did was to offer a prize of a considerable sum of money for an essay upon the development of trade with Jamaica. Two of a great number which were submitted were selected and have been beautifully bound and distributed by the company. These essays show the hard practical sense of the writers.

tween Kingston and Bristol. The smaller boats have accommodations for 20,000 bunches of bananas, and although the Port Morant holds the record for the passage between Bristol and Kingston of 11 days 12 hours steaming, their passenger accommodation is limited to forty first and sixteen second-class.

The products of Jamaica are bananas, pineapples, tobacco, coffee, sugar and spices, which require but little care for their cultivation. The soil yields so generously that the natives, before the advent of the English, made no effort at cultivation whatever but lived upon what nature voluntarily contributed. The steamship company has secured the control of the hotel which the government built upon the island ten years ago and has every facility for caring for the tourist. The cost of living upon the island is exceedingly moderate. The steamship service is only a few months old but there are already sufficient indications that the development of Jamaica during the next few years will be swift.

## ACTIVITY IN PHILADELPHIA SHIP YARDS.

Philadelphia, Aug. 28.—Towards the end of next week the Russian battleship Retvizan will leave Cramps' ship yard on her first official trial trip. The date was originally set for Sept. 11, but it is thought by the officials in charge that the Czar's big fighter will be ready at least a week



THE STEAMSHIP PORT ROYAL IN THE BRITISH-JAMAICA SERVICE.

Built by Messrs. Sir Raylton Dixon & Co., Ltd., Middlesboro-on-Tees.

They are not literary productions but a careful discussion of trade conditions. The one thing which Jamaica has to offer to the world in an unending profusion when properly cultivated is the banana. Mr. Jones had stimulated the cultivation of the banana in the Canary islands and had introduced it to the British palate, which took most kindly to this admirable fruit. The Jamaica banana is no less a success.

The distance from Avonmouth to Kingston is about 4,000 miles and the voyage is accomplished in twelve or thirteen days. The Review publishes in connection with this article pictures of two of the steamers employed in this service—the Port Antonio and Port Royal. These vessels were built by Messrs. Sir Raylton Dixon & Co., Ltd., Middlesboro-on-Tees, and engined by Messrs. Richardson, Westgarth & Co., West Hartlepool, and are 382 ft. in length, 46.6 ft. in width and 32.7 ft. in depth. The upper and lower 'tween decks are insulated for the carriage of bananas and the temperature in these holds is kept down by means of Messrs. J. & E. Hall's cold air system. The air, driven over cold pipes, is forced by fans through trunkways which run fore and aft in these decks, and which are supplied with shutters which deflect a certain amount of the air into different portions of the deck, thus enabling the carriage of 25,000 bunches of bananas in good condition. The capacity for general cargo is about 1,500 tons and in addition to this the steamers are fitted with splendid accommodation for 100 first-class and sixty second-class passengers. Everything possible has been done to insure the comfort of those traveling on these steamers. The saloon itself is beautifully paneled in marble and presents a delightfully cool appearance. The hull of the Port Royal is painted white, which gives an added effect of coolness. These two steamers, together with the steamers Port Morant and Port Maria, vessels of a much smaller type, keep up a fortnightly service be-

before that time. Gen. A. Brynk, first assistant to the chief of ordnance of the Imperial Russian navy, is expected in Philadelphia today. He has been appointed by the minister of marine to supervise the firing tests which will be an important feature of the coming trials at sea. It is understood, in fact, that the object of this first run is merely in the nature of a test of the structure of the ship, although the builders will doubtless assure themselves that she has the ability to meet the stringent contract requirement of 18 knots an hour during twelve consecutive hours' steaming.

The thoroughness of the tests required by the Russian government in connection with a new ship for their navy is well illustrated by the nature of these that are to be made of the structure of the Retvizan. Almost daily for months past the board of Russian officers supervising the construction of the ship has been conducting experiments of one kind or the other to satisfy themselves of the quality of work which has been done on the Retvizan. Especially searching tests have been made of the various compartments, but the big ship has naturally been put through no such trial as she will receive in a very few days. Each of the big 12-inch guns will be fired to discover any possible flaws in the structural strength of the hull. In the case of the cruiser Variag, the Russian experts were thoroughly satisfied with the outcome of the test, and express confidence that the Retvizan will meet the requirements as well. The number of rounds of ammunition which will be fired from each gun will depend upon the desire of Gen. Brynk in the matter. Only the 12-in. guns will be fired and no sailors in addition to those already at the yard will be needed. There are here now thirty-eight men and five warrant officers, enough to man the big guns. Early in October, before the official speed trial, which will be run off the Maine coast, eighty-nine



additional men and fifty officers will arrive from Cronstadt. The new battleship will be commanded by Capt. Eduoard Stehensnovitch, who has been president of the board supervising her construction.

In many respects the Retvizan is like the new Maine, recently launched at Cramps'. The two went up side by side in their early stages, although the Russian ship was first in the water by several months. The contract for her construction was executed April 23, 1898, in St. Petersburg, by Charles H. Cramp, president of the Cramp company, and by Admiral V. Verhovskoy on behalf of the Russian government. The Retvizan is 368 ft. long between perpendiculars, 72 ft. 2½ in. beam, 25 ft. draught, and her displacement at that draught will be 12,700 tons. She has triple expansion engines and has been fitted with water tube boilers of the Niclausse type, calculated to develop 16,000 H. P. and to give sufficient steam for 18 knots speed. Krupp armor is to be used throughout for protection and wood has been eliminated almost entirely from her construction.

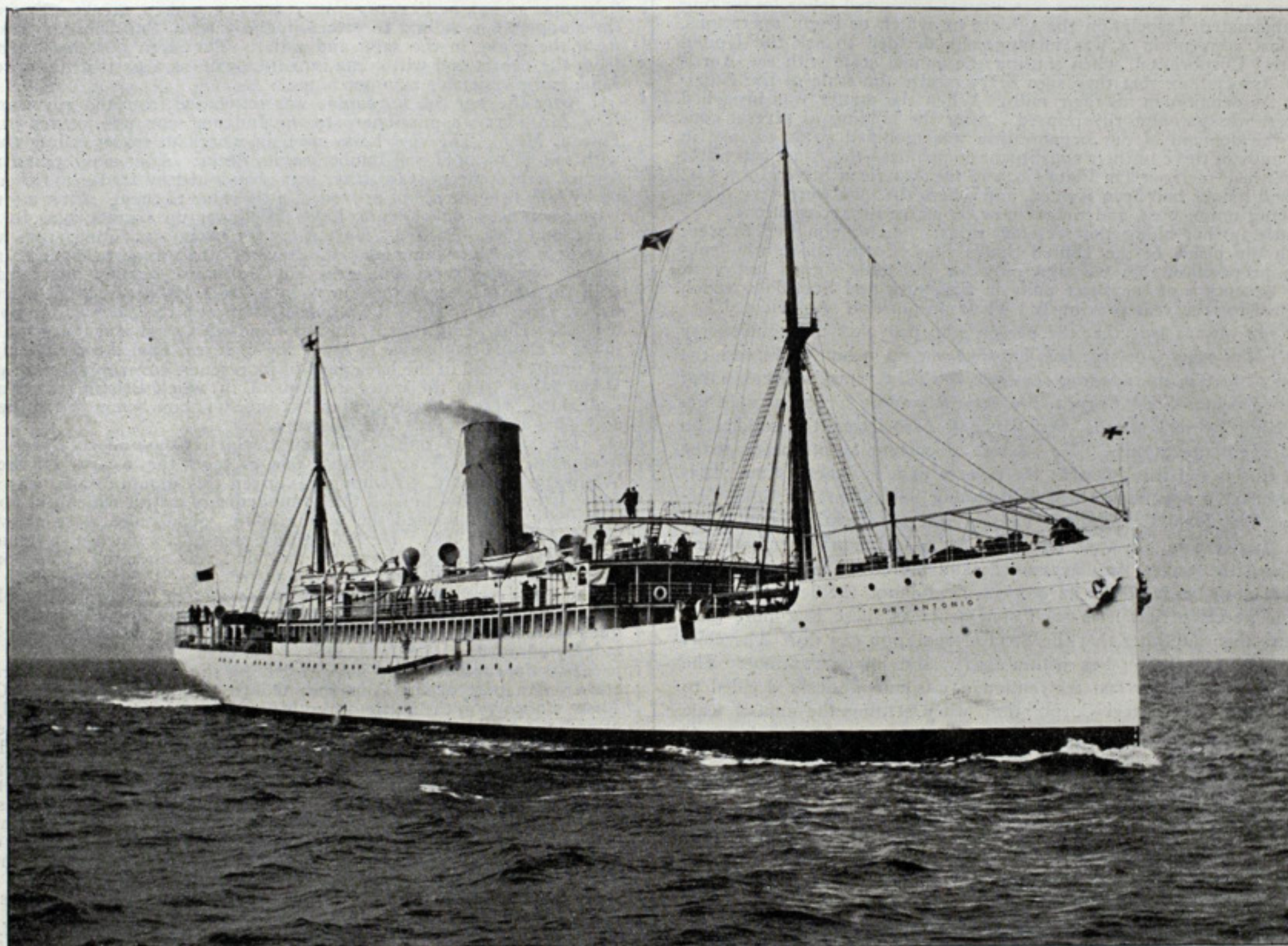
The four steam launches for the Retvizan, built at the Crescent yard of Lewis Nixon, Elizabethport, N. J., arrived here last Sunday. Two of them are pinnaces or patrol boats. They are 60 ft. long and armed with a machine gun. The other two, which are 50 ft. in length, are steam cutters. These are also armed with a machine gun each and have supplemental torpedo tubes. They are all driven by steam, are decked over

The Cramps have been notified of the final acceptance of the battleship Alabama, built at their yard, and the final payment will be made in a few days. One-fortieth of the contract sum yet remains to be turned over to the builders.

The great fire among the oil tanks of the Atlantic Refining Co. at Point Breeze, which broke out August 18, burned for nearly a week before it was extinguished, causing a damage estimated at close on to \$1,000,000. Three firemen and one employe of the plant lost their lives and 117 persons were injured. The majority of the oil burned was that for foreign exports and it was at first feared that many vessels would be detained for their cargoes. Those which have arrived within the last few days, however, have been ordered to the Standard Oil piers at Marcus Hook, near Wilmington, and are getting away with not more than a day or so detention in each instance.

The feature of the week in local shipping has been the arrival of a large number of steamships laden with sugar. During the past ten days there have been eight such, all but two from Java and the far east. Some sixteen others are now on their way to this port from Sourabaya and other Singalese ports. From indications at present the local refineries will have plenty to do the coming winter.

The torpedo boat destroyer Bainbridge, building at Neafie & Levy's ship yard, was launched Tuesday morning. Her sponsor was Miss Louise



THE STEAMSHIP PORT ANTONIO IN THE BRITISH-JAMAICA SERVICE.

Built by Messrs. Sir Raylton Dixon & Co., Ltd., Middlesboro-on-Tees.

and lighted by electricity. The quartette will be carried on the deck of the Retvizan and when in service each will have a crew of twelve men.

The first plates of a consignment of 400 tons of Krupp armor, a sample of which recently underwent a successful firing test at the Indian Head proving station, has been delivered for the battleship Maine. The builders of this vessel are extremely desirous of securing the rapid delivery of armor and trust that they will not be greatly delayed by its failure to arrive promptly in the future.

The Neafie & Levy Ship & Engine Building Co. report that the alteration to the Clyde line steamer Comanche, in which she was lengthened 48 ft., has been practically completed and the vessel can leave the yard in about two weeks. It has been one of the most successful jobs of the kind ever undertaken by this company. Less than a month ago the Comanche was floated in the drydock. Since then she has been cut in two, drawn apart and has been made substantially a new vessel with almost double cargo capacity. This unique feat in ship building attracted many visitors from distant points to the yard, who watched with the greatest interest the transformation in the appearance of the vessel.

Capt. Caspar F. Goodrich has been assigned for duty as the commandant of the League Island or Philadelphia navy yard, to succeed Capt. Charles E. Clark of Oregon fame, who goes to the naval home. Up to a few days ago it was believed here that Capt. George W. Pigman, recently relieved from the command of the monitor Monterey, would come to League island, but his friends protested to the navy department, with the result that he will await an assignment more to his liking. Capt. Goodrich is now a member of the staff of the naval war college at Newport, having been performing that duty since July 13, 1900. He entered the navy in 1861, and has had a varied experience.

Bainbridge Hoff, daughter of Capt. Bainbridge-Hoff of Washington and granddaughter of Commodore Bainbridge. The long list of invitations sent out by the builders included the heads of the various naval bureaus and many persons prominent in the social life of Philadelphia, Baltimore and Washington. The Bainbridge is about 96 per cent. completed. In a few days she will proceed to the Delaware bay for her speed trial. The latter will be run over the measured course off Deep Water point. The contract requirement is for a speed of 29 knots, but it is thought that the alteration to the stern of the boat allowing her to get rid of the water to better advantage will increase her speed by a knot at least. It has been decided by the Neafie & Levy company not to launch the Barry and the Chauncey until the performance of the Bainbridge has demonstrated the efficiency of the charge mentioned.

Sudden & Christenson, lumber dealers and vessel owners of No. 6 California street, San Francisco, are enthusiastic in praise of a steam towing machine furnished to them some time ago by the American Ship Windlass Co. of Providence, R. I. The reason is given in a letter to the manufacturers, of which the following is an extract: "Mr. U. S. Bryant, who is in charge of the steam towing machine on the tug George R. Vosburg, reports to us that the device has, in his estimation, paid for itself in the first trip over the Nehalem in saving the barge which was in tow from destruction on the bar. Immediately upon grounding of the barge the machine paid out cable enough to permit the tug to pass over the bar, and then with the combined power of the tug and towing machine the barge was hauled off the spit. Mr. Bryant states that he considers the tug power increased one-third by the use of the machine." This is the smallest size the manufacturers make.



# MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

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Among a number of the things which the leaders of the Amalgamated Association lack is the ability to tell the truth. This strange and unaccountable perversity seems to be fundamental with them. No statements have been given to the public by the leaders of this unfortunate organization—unfortunate because it has such leaders—that has not been simply honeycombed with falsehood. The secretary of the association seems to have been inoculated with the creed of Shaffer for he, too, has issued a bald and extraordinary statement to all members of organized labor. In this circular he says:

"Brethren—As you are now undoubtedly aware, the United States Steel Corporation is now waging war against organized labor by making the Amalgamated Association the subject on which to begin operations. At our last convention it was unanimously decided to ask the United States Steel Corporation, when settling the annual scale with the Amalgamated Association, that they sign or recognize the scale of the Amalgamated Association in all their mills. When the matter was broached the request was peremptorily refused. After the holding of several conferences the demand of our organization was modified so as to take in only the mills of three of their constituent companies—the American Sheet Steel Co., the American Tin Plate Co. and the American Steel Hoop Co., where local lodges had been formed, and where the men were very desirous of being union men, and we are now on strike for recognition."

A little further along the secretary adds: "Later conferences were held with the heads of the United States Steel Corporation, who submitted a proposition that we sign only for the mills signed last year, with the exception of the sheet mills in Saltsburg and Scottdale, which were signed for the year previously. Their proposition was rejected."

Is it not always true that the person who provokes the controversy thinks it is the other side that has declared war upon him? Witness the confusion of fact in the opening sentence of the secretary's circular that the "United States Steel Corporation is now waging a war against organized labor by making the Amalgamated Association the subject on which to begin operations." No student of current events needs to be told that this is not true but that the reverse of it is exactly true. It is the Amalgamated Association which is making war against the Steel Corporation. The Steel Corporation had no grievance against the Amalgamated Association. It was employing the association's members and paying them the wages they demanded; and moreover it was living in perfect harmony with all of its workmen. Cannot the leaders of the association perceive that it is such statements as these that hurt their cause more than anything that the Steel Corporation can do? The chief danger to the association lies within itself. But let us continue. The secretary says: "At our last convention it was unanimously decided to ask the United States Steel Corporation, when settling the annual scale with the Amalgamated Association, that they sign or recognize the scale of the Amalgamated Association in all their mills."

Here is the fell purpose deliberately set forth—a purpose which says not in so many words but in effect that the mills of the great corporation, its great army of workmen and its vast investments must be directed and regulated by the Amalgamated Association. Has the association ever given any evidence that it possesses the ability to direct so great an organization of men and means? We have not observed any. Setting aside the control of capital what security has it to offer to the workmen whom it would seek to coerce into its membership? It has already deprived of livelihood a great many men who had no fault to find with their employers. We fancy that the workmen of the United States are resenting the presumptuous attitude of the amalgamated association far more than are the capitalists. The secretary says that when the matter was broached it was peremptorily refused—evidently to his great surprise. But it would have been a very sorry day for the American workman had it been accepted. The fact remains that the United States Steel Corporation has not refused to recognize the Amalgamated Association where it has established lodges and where the men employed have desired to continue in that relationship. The present strike is a dishonorable one and because it is dishonorable it is going to fail.

What is this body of men which has sought to intimidate one of the greatest industries in the country? The journal of the last annual meeting of the Amalgamated Association has just been made public and reveals a number of facts of considerable interest. One of unusual importance disclosed is that the amalgamated association's membership numbers less than 14,000, and that probably not more than 8,000 of these are on strike. The treasury fund amounts to less than \$75,000. When it entered into the present warfare with the Steel Corporation the association had 160 active subordinate lodges, with a total of 13,892 members and a balance in the treasury of \$74,898. The journal shows that the organization is weaker in numbers for the year ending in May last than it was the year before. It had twenty-one lodges less and showed a total loss of membership of 143. There are 3,500 members of the Amalgamated Association employed in the plants of the Republic Iron & Steel Co. and

1,000 more are employed in independent plants, leaving only 9,392 members of the union employed in the mills of the Steel Corporation before the strike. The failure of hundreds of these to come out reduces to less than 9,000 certainly, and probably to somewhere near 8,000, the number of actual strikers against the Steel Corporation. As there are 30,000 skilled workmen and 50,000 laborers in the various plants of the American Sheet Steel, American Steel Hoop and American Tin Plate companies, it is seen at once what a ridiculously small proportion the actual membership of the Amalgamated Association bears to the whole number eligible to membership. It shows how unreasonable and preposterous the demand of the Amalgamated Association is.

## FATE OF THE SLOOP PORCUPINE.

Lying in a heap of debris in the back yard of Charles Bolthouse at Ferrysburg, Mich., is all that is left of the old sloop Porcupine of Commodore Oliver Hazard Perry's famous fleet—one of the little gun vessels of one gun which sailed into close action with the British squadron at the battle of Lake Erie and won the battle after the heavy Lawrence had been visited and sunk. After several years as a diminutive man-of-war on the lakes, sixty years as a lake trader and a few months as a fisherman's boat, and twenty-four years as a sunken wreck in Spring Lake, the sloop now is falling to pieces in the yard of the man who rescued it from the grave in the sand and water. The stern post has been taken from the debris and will come into life again as a part of the porch of a Michigan physician's summer home.

After the war the Porcupine was purchased from the government by Rev. Mr. Ferry, a missionary to the Indians, who was located at Grand Haven, Mich. The vessel was used in merchant trade, sailing the lakes with salt in its hold and lumber on its decks. After sixty years of good service it became unseaworthy, was abandoned by trade, and then taken up by lake fishermen, but proved of little value to them. After a few short voyages it was sailed from Lake Michigan up Grand river to Spring Lake, and there beached. Here it lay for twenty-four long years with the merciless waves dashing over it. Several attempts were made to raise it, but no one was successful until Mr. Bolthouse became interested. He, with the aid of a large capstan and two sets of blocks, lifted it from the water. He had secured the whole bottom and the sides as far up as the deck, the ribs being intact. It was filled with sand and the great weight made it almost impossible to move it, but it was hauled a couple of blocks and finally placed in the back yard of its rescuer, covering 65 ft. of ground. When taken from the water its timbers, in which British bullets are still embedded, were perfectly sound, but the sun soon began to rot the wood, and what is left now is fast decaying.

The sloop was one of the finest which Commodore Perry, then a lieutenant, had built at Presque Isle to meet the British on the lakes. When the lieutenant, to whom was given this gigantic task, was sent to Lake Erie he found himself the commander of a fleet which did not exist. The trees which formed the beams of his vessels still were growing on the shores of the lake. He had neither men-of-war, men-of-warships, nor guns. He had energy, however, and that was enough. The Porcupine was one of the vessels thus rapidly constructed. It was destined to be one of the small members of the fleet which met the enemy and took them captive. One gun was its armament. Two large brigs to mount twenty guns each were laid down at Presque Isle, and the small gun vessels were quickly completed.

The Porcupine had to help in driving the British out of Detroit. It conveyed a part of the American troops to landing in Upper Canada. These troops won the battle of the Moravian towns on Oct. 5, 1813, which placed the upper part of the province in the hands of the Americans. Upon this little vessel and the other boats of the fleet depended the American supremacy on the lakes. Under Perry's energetic management two large brigs, the Porcupine, and several other small gun vessels soon were launched. The spring of 1813 was passed in securing guns, shot, and other supplies, and a draft of men to put behind the guns. By August he had his fleet and 300 men, had been raised to the rank of captain, and less than five months had been sufficient to convert the trees which were growing on the lake shore into armed vessels.

When the little Porcupine set out to receive its baptism it was in the company of the following boats: Lawrence, twenty guns, Capt. Perry commanding; Niagara, twenty guns, Capt. Elliott commanding; Caledonia, three guns, Mr. McGrath commanding; Ariel, four guns, Lieut. Packett commanding; Trippe, one gun, Lieut. Smith commanding; Tigress, one gun, Lieut. Conklin commanding; Somers, two guns, Mr. Almy commanding; Scorpion, two guns, Mr. Champlin commanding; Ohio, one gun, Mr. Dobbins commanding.

## DESCRIPTION OF STEAMSHIP PATHFINDER.

It was announced this week that the new steamship Pathfinder, the latest addition to the fleet of the New York & Porto Rico Steamship Co., which was launched at Harlan & Hollingsworth's yards, Wilmington, Del., on Aug. 14, will go into commission on Nov. 1. Quite a number of Brooklyn people are financially interested in the vessel, which is intended to run for the company during the sugar season and then be chartered out for the rest of the year. The vessel will cost \$295,000 and will be one of the most completely equipped steamships afloat. She will have no passenger accommodations whatever, being designed entirely for the West Indian freight trade. Her principal dimensions are: Length, 331 ft.; beam, 44 ft. 11 in.; depth of hold, 35 ft.; draught loaded, 19 ft. 6 in. She is specially designed to carry a big cargo on a light draught and is guaranteed to carry 200,000 cu. ft. on the draught named. Her speed will be 11 knots, which will bring her into the class provided for in the subsidy bill. She will have two double-ended Scotch boilers, 11 ft. in length and 15½ ft. in diameter, suited to a working pressure of 170 lbs. Her triple expansion engines are of 23, 38 and 62 in. diameter and 42 in. stroke. She will consume 18 or 20 tons of coal a day. She has a cellular double bottom to hold 600 tons of water ballast and is equipped with four water tight bulkheads. To minimize rolling she is fitted with bilge keels, each 110 ft. in length. On deck are four double hoisting machines equivalent to eight winches. These will be operated by a donkey boiler 9½ ft. by 8 ft. She is classed A1 at Lloyds. Henry T. Knowlton and Amos D. Carver are the managing owners.



## ROLLING OF PASSENGER SHIPS AND POSSIBLE REMEDIES.

BY LAWRENCE IRWELL.

A fact that usually strikes the traveler when crossing the Atlantic is that, in spite of the great and numerous improvements of late years in ocean steamers, which have made life pleasant and luxurious, little has been done to steady a ship when she meets the waves which make her roll from side to side. For a number of years the tendency seemed to be in the direction of increased rolling, for the steadying influence of sails, which makes the motion of a sailing vessel comparatively agreeable, was fast disappearing on large steamers. On the Atlantic liners the sails have been cut down in size until such fragments as remain, when any still exist, are so small compared with the size of the vessel as to retain little power to reduce rolling. Without any unfairness it may be said that until quite recently ship-owning companies did not show much sympathy for the discomfort which rolling causes many passengers. No doubt they became anxious when a ship acquired the unenviable reputation of being an extreme roller, because passengers discriminated against such a vessel, and her earnings diminished as a result; but beyond attempting to deal with abnormal cases, little was done to mitigate the evil. Either rolling was regarded as incurable, or else it was not considered of sufficient importance to warrant a great deal of trouble. Nevertheless, there is nothing that would contribute so directly to the comfort of landsmen at sea, or do so much to change what is for many persons—men as well as women—misery into comfort as to minimize as far as possible the rolling proclivities of sea-going passenger ships.

The laws which govern rolling are now well understood, and it is somewhat remarkable that this knowledge has not enabled an effective method of control to be desired. What is perhaps still more remarkable is that the various suggestions for minimizing rolling have not been more systematically investigated. It is not easy to obtain from a ship builder or designer a non-technical account of what causes a ship to roll. The following statement, nevertheless, seems to come tolerably near to an explanation in easily-understood language.

A ship rolls about a longitudinal axis which is approximately at her center of gravity, and the rolling is almost at equal intervals and at moderate angles in ordinary ships. The heaviest rolling occurs when the wave-period synchronizes with the natural period of oscillation of the ship. Quite a large number of ships are comparatively free from rolling till they meet waves of this period, and if such meeting could be avoided, excessive rolling could be prevented. Some vessels have periods as long as fifteen to eighteen seconds for the double oscillation, and as these would require to meet with waves from 1,200 to 1,500 ft. in length in order to provide the conditions of synchronism, it is seldom that they suffer from heavy or cumulative rolling. But waves of the above-named length are not rare on the Atlantic. The limits of heavy rolling are fixed by the resistance offered by the water and air to the transverse rotation of the ship, which is very great because of the large areas that directly oppose motion in a transverse direction. But for this resistance, and the condition that rolling is only uniform in time ("isochronous" is the technical term) within moderate angles of inclination, a few waves of the same period as that of a ship would capsize her.

The two most obvious modes of preventing rolling are, therefore, (1) to make the period of rolling of a ship as long as possible, so as to reduce the chances of meeting waves whose period will synchronize with it, and (2) to increase the resistance to rolling. The period of a ship varies directly as her radius of gyration, and inversely as the square root of her metacentric height. Consequently the period may be increased by adding to the moment of inertia of the ship, or by decreasing the metacentric height. In armored war vessels, the moment of inertia is considerable, on account of the heavy weights of armor on the sides and heavy guns that are either placed at the side or high up above the center of gravity. Ordinary steamers have not such weights concentrated at considerable distances from the center of gravity, and their moments of inertia are determined by the distribution of material in the hull which is fixed by structural conditions in the hull and by cargo arrangements. Metacentric height, that is the distance of a ship's metacenter above the center of gravity, cannot be reduced below a certain amount, which is necessary to prevent too easy inclination of the ship, or unsteadiness in calm water. All things considered, we may regard the longest periods that the biggest ships are likely to have with advantage to be those named above, fifteen to eighteen seconds.

Length of period cannot give immunity against occasional rolling; but the increase of resistance reduces the angles of roll at all times, and especially when the angular velocity is greatest and the rolling is worst. Such resistance is furnished by friction of the bottom of the ship, and especially by projecting parts of the bottom, such as the keel and the large flat surfaces below at the stem and stern. This resistance can be largely increased by means of bilge keels, and their value is admitted by almost all naval officers. The war ships of many countries have been fitted with them for a number of years past with beneficial results, their advantages having been originally proved by careful experiments in the French navy. Further, a number of trials made some thirty years ago on the British man-of-war *Greyhound* demonstrated that even bilge keels of great size—3 ft. 6 in. deep and 100 ft. in length, on a ship 172 ft. long—had only an insignificant effect upon speed throughout great differences of "trim."

A decade ago, bilge keels had not been adopted by the mercantile marine, and there seemed to be an almost universal prejudice against their use among the owners of the great passenger steamers. At this period it would have been difficult to discover any great Atlantic liners that had such keels. Nous avons change tout cela. The *St. Louis* and *St. Paul* were fitted with them about fifteen months since; all the more modern Cunarders (eight) have them, and so has the great *White Star* liner *Oceanic*. Whenever bilge keels have been made of suitable size and properly placed, it has been found that the angles of rolling have been reduced by nearly one-half. The prejudice against them was due to a belief that they were detrimental to speed. Mr. Frondé's experiments showed the contrary, but they were, it is true, made in still water. It is certain, however, that at sea any loss of speed which still-water trials might show would be more than compensated for in a heavy sea by gain in speed when the vessel is prevented from rolling through large angles from side to side and undergoing great changes of underwater at every

roll. Experience with ships that have had bilge keels added after running for some time without them shows that there has been no appreciable difference of speed or increase of coal consumption on the subsequent voyages.

Another, and a more drastic method of stopping or reducing rolling would be to counteract the reclining moment of the ship caused by the ever-changing inclination of the waves by an equal and opposite moment, which would vary as the inclining moment varies. This has been attempted at different times and in various ways. It is essential to any degree of success, however, that the opposing moment brought into operation should be completely under control, so as always to act in the manner and to the extent required. The efforts to obtain a steady platform by freely suspending it and making it independent of the rolling of the ship, have failed—apart from the practical difficulties of carrying out such an arrangement on a large scale—because the point of suspension oscillates when the ship rolls, and the platform acquires a rolling motion of its own. Weights, made of heavy solid material, which move from one side to the other of a ship subject to the action of gravity and rotation, fail because they cannot be made to act continuously in the manner required.

Some degree of success has been achieved by admitting water into a suitably prepared chamber and leaving it free to move from side to side as the ship rolls. This has been done in several ships of the British navy, but I have not found any record of its employment in the navies of other nations. The movement of the internal water follows the inclination of the ship, but it lags behind, and thus tends to reduce the inclination. Its effect can be regulated by the quantity of water admitted to the chamber and by its depth. The naval committee which experimented with the English ironclad *Inflexible* stated in their report that comparatively slight changes in depth increase or diminish largely the extinctive power of the water. For various reasons—one of which is that while such a chamber is very effective in a moderate sea, it fails in a rough sea when the rolling of the ship is greatest—and perhaps partly on account of the destructive and disturbing effect of 100 tons or more of water rushing from side to side of a ship over 60 ft. wide—these water chambers appear to have gone out of use, and they have been abandoned on the *New York* and the *Paris*, which vessels are said to have been supplied with them when they were first placed on the Atlantic service.

A few years ago an Englishman, Mr. Thornycroft, devised a means of checking rolling by moving a weight under strict control from side to side of a vessel so as to continuously balance or subtract from the heeling moment of the wave slope. It consists of a large mass of iron in the form of a quadrant of a circle, which is placed horizontal, with the center on the middle line of the vessel, and there connected with a vertical shaft. This shaft is turned by an hydraulic engine, which is controlled by an automatic arrangement. The heavy iron quadrant is swept around from side to side, revolving about its center to the extent that is required to counteract the heeling movement. Mr. Thornycroft's description of his apparatus was as follows: "The manner in which the controlling gear works will be best understood if we imagine a vessel remaining upright among waves, while near the center of gravity of the ship we place a short-period pendulum suspended so as to move with little friction; this will follow the change in apparent direction of gravity without appreciable loss of time, so that any change in the wave angle cannot take place without due warning, which will indicate the time and the amount of the disturbance. It is therefore only necessary to make the motion of the balance bear some particular and constant ratio to the motion of this short-period pendulum to keep the balance true. The inertia of a heavy mass will cause some loss of time, as we can only use a limited force for its control; but it is possible to accelerate the phase of motion and overcome this difficulty so as to get good results. If, now, we imagine the ship to roll in still water, the effect of the combination just described will be to balance the ship's stability for a limited angle; but this defect is removed by the introduction of a second pendulum of long period, which tends to move the ballast in the opposite direction to the first one, and enables the apparatus to discriminate between the angular motion of the water and that of the vessel. I find, however, that the long-period pendulum is rather a delicate instrument, and that its function can be served by a catract arranged so as to always slowly return the ballast to the center, and this device has the effect to accelerating the phase of motion which, in some cases, we also require. We are therefore able, by very small parts, to construct an apparatus which will indicate the direction and amount of motion necessary to be given to the ballast at a particular time so as to resist the wave effort; this power of indicating may be converted into one of controlling by suitable mechanism. The loss of time due to inertia of the necessary ballast is not always unfavorable when the apparatus has to extinguish rolling motion, the great effect being obtained when the ballast crosses the center line of the ship at a time when it is most inclined to the water surface, and this corresponds to a quarter of the phase behind the motion of the short pendulum."

This apparatus was tested a few years since upon an English steam yacht. As far as I have been able to ascertain, however, it has not been tried upon any steamer of very large size, perhaps because a moving weight of something approaching 150 tons would probably be required on such vessels. But, as the power necessary to control the movement of the weight appears to be small, the invention may eventually be used to reduce the rolling of moderate-sized ships, if it cannot be applied to leviathans of the ocean.

That it might be nearer its source of steel supply and also have better freights on its growing eastern trade, the *Champion Rivet Co.*, Cleveland, is planning for new works in the Pittsburgh district. A tract of 10 acres of land has been purchased at New Kensington, on the Allegheny river, and the *Wellman-Seaver Engineering Co.* is preparing details of what it is proposed to make the best equipped rivet-making plant in the world. Its capacity will be considerably larger than that of the Cleveland plant, but both will be kept in operation. The output of Victor boiler rivets, which has been steadily increasing, will thus be much larger than is possible with present facilities.

In another part of this issue the *Detroit Trust Co.*, receiver, advertises for sale the entire property of the *Detroit Boat Works*, a concern that for a great number of years conducted on the Detroit river an extensive business in the manufacture of yachts, launches, life boats, etc.



## NIPPON YUSEN KAISHA.

ONE OF THE MARVELS OF THE COMMERCIAL WORLD HAS BEEN THE RAPID GROWTH OF THE JAPANESE MERCANTILE MARINE.

The Nippon Yusen Kaisha, which has for years been running a monthly service from Seattle to Yokohama and Hong Kong, has now decided to make the service a fortnightly one. The following new steamers specially built for the trade will in the future run in this service: the Shinano Maru of 6,388 tons gross, built last year by D. & W. Henderson & Co.; the Kaga Maru of 6,301 tons gross, built this year at Nagasaki, and the Iyo Maru, at present building in Japan. The Nippon Yusen Kaisha, which is the Japan Mail Steamship Co., operates a line from Seattle in conjunction with the Great Northern Ry. This great steamship company has just held its annual meeting, and the report presented to the shareholders was of a very favorable nature and showed that the Japanese mercantile marine is making rapid progress. At the meeting Mr. Kondo, the president, gave some very interesting particulars of a tour of inspection which he had made in Europe and the United States, chiefly with a view of making himself more thoroughly acquainted with shipping matters. He explained that his objects were to show whether the foreign service inaugurated by the company could be successfully accomplished at present or not; secondly, to ascertain the position held by the company in relation to similar corporations elsewhere throughout the world; thirdly, to determine the present and future prospects of vessels engaged in the maritime enterprises of the world, and finally to express his views as to the manner in which the company ought to conduct its business in future.

With regard to the first point, Mr. Kondo reviewed the history of the foreign service of the company and explained its development and progress. It commenced with the Bombay line shortly before the war with China. That war afforded a unique opportunity of accomplishing the object for which the company had labored during many years, and a proposal submitted at a general meeting of the shareholders about that time for the opening of three great routes of navigation met with their unanimous approval. Despite the serious difficulties experienced by the company, the new enterprises made steady progress. It was, indeed, not an exaggeration to assert that the four lines—European, American, Australian and Bombay—have made greater development than was anticipated by the original scheme. Not only has the number of vessels on these lines been increased, but also ships of larger dimensions are now used. On the American line three ships were increased to six, and likewise in the case of the European line a fortnightly voyage is now undertaken. It is worth while, Mr. Kondo said, to remark that since the inauguration of the foreign services the results have been so satisfactory that every line has virtually consolidated its credit.

As to the European line, the freight of raw silk was diminished by 30 per cent. during the year under review. Indeed, the company did everything in its power to restrain the enhancement of freight and to decrease rates, with the object of encouraging exports from Japan. The government used the ships of the company for the import of naval and military stores; and the transport of the large number of officers and men appointed to bring home warships from abroad by the same means, and in other ways the company has received ample protection and assistance from the government. At the same time Mr. Kondo believes that it is certain that if the difference in freight paid by the government and the public to the various foreign steamship corporations, and to the Nippon Yusen Kaisha since the inauguration of its foreign service be calculated, the amount will come to really striking figures. This is particularly true of the Bombay line. When the foreign service was opened by the company the rates of freight for raw cotton stood at 17 rupees per ton, and these were not only reduced to 12 rupees, but other companies engaged in similar business agreed to adopt them. Indeed, the progress which the spinning industry in Japan has made during the past few years owes much to the benevolent efforts thus made by the company. No doubt the plans of the company were favored by the unique opportunity for their execution; but Mr. Kondo did not hesitate to assert that it had succeeded in attaining the objects which it originally desired to accomplish. Moreover, he believes that, from the point of view of national policy, the protection and encouragement given by the government has been amply justified.

With regard to the position which the company holds among foreign corporations conducting similar business, in point of capital it holds the fifth rank, and in tonnage the seventh, as compared with the two steamship companies of Germany—the Hamburg-American and North German Lloyd—and four others, namely, the Messageries Maritimes Co. of France, the British India, the Peninsular & Oriental, and the Union-Castle of England. In the matter of fortnightly service between Japan and Europe the company is in no way inferior to the Peninsular & Oriental, the Hamburg-American, and the North German Lloyd. In its American service it is on an equal footing with the Pacific Mail Steamship Co. and the Occidental & Oriental Steamship Co., while in respect to the Australian line it is even superior, and certainly by no means inferior to any of the corporations pursuing the same business. In short, the company has now secured a proper footing and a proper degree of influence among large marine corporations of various nationalities.

Mr. Kondo entered into an examination of the present and future prospects of vessels employed in the maritime enterprises of the world. He believes that it is certain that the marine enterprises of the world are destined to engage in great competition in the future. Each nation will, with a desire to outrace others, endeavor to construct ships of larger dimensions and of greater speed, with more perfect equipment, and with every convenience that may be conceived of. This sort of competition is certain to be accompanied by an increase of the capital employed, an extension of maritime services, and an augmentation of the gross fleet. Recognizing these facts, and the shipping developments which are certain to take place in connection with the Siberian railway, Mr. Kondo clearly perceives that some serious changes will take place in future in regard to means of transport and communication between Europe and America. Japan has, to a certain extent, attained maritime ascendancy in the adjoining seas of the orient, yet there is cause for apprehension that her

present position may, some day, be encroached upon by other nations. The tendencies of the times and the forces at work are clearly recognized by the directors of the Nippon Yusen Kaisha, and they are evidently determined to spare no effort not only to maintain their present position, but also to extend their work and influence.

During the half-year under review the gross receipts of the company amounted to 11,490,127 yen, and the expenditure to 7,637,772 yen, showing a balance of 3,852,354 yen in favor of the former. Of this amount 1,034,565 yen was set apart for various reserves, in conformity with the regulations, and various sums for depreciation of buildings, leaving a net profit of 2,804,530 yen. Out of this total, 140,226 yen were set apart for the reserve prescribed by the commercial code, 500,000 yen for the equalization of dividends, 733,729 yen as a ship's fund 78,526 yen as special allowances for directors and auditors, 1,100,000 yen as dividends to shareholders (at the rate of 2.50 yen per share, which gives 10 per cent. per annum on the 50-yen shares), and 631,969 yen to be carried over to next account. These figures not only show that the business is being carried on with good profits, but also that the directors by building up their reserve and depreciation funds are putting it on a thoroughly sound basis. In order to make it still more secure, arrangements are being made to adjust the valuation of the ships and make good their maintenance, and thus permanently consolidate the foundation of the company's assets.

## POWER IN A POUND OF COAL.

A pound of coal can produce power sufficient to pull a large express train a distance of one-sixth of a mile, going at the rate of 50 miles an hour, writes an expert locomotive engineer. You would be surprised at the wonderful amount of work which the energy from this small quantity of coal can do. For the purpose of explaining, take, for instance, a pound of what might be called average coal, containing about 10,000 heat units. This would be somewhat smaller in size than a man's fist. If this pound of coal could be burned completely and entirely under water and all of its heat should go into the water, a temperature of 625 lbs. of water could be raised to the height of 1 ft. If this pound of coal could be completely burned in water 1 ft. deep, with a temperature of 64°, and all the heat from this coal be imparted in the water, this water would become 16° hotter, thus being suitable for a comfortable bath. If adapted to mechanical work, the 10,000 heat units in the one pound of coal would be equivalent to 236 H.P. The 236 H.P. of potential energy contained in the pound of coal is enough to haul a train of eight cars for a period of one-fifth of a minute, or a distance of one-sixth of a mile, going at the rate of 50 miles an hour. It has also been found to be able to draw a cable train, including the grip car and trailer, for a distance of two miles at the rate of nine miles an hour. It would also be of sufficient power to pull an electric car, well filled with passengers, for two miles and a half, at a rate of ten miles an hour.

If the power in this pound of coal is compared with the work of a strong man used to hard labor, it would be found that there is more than sufficient power in the pound of coal to do in one minute the day's work of eight hours, of five strong men. This is accounted for in this way: The work of a strong man, used to hard work, is estimated as being equal to one-tenth of a horse power. The eight hours he works is equivalent to 480 minutes. Naturally, while working, a man makes a number of stops, either to rest or change the monotony of his position. These stops, then, would, without difficulty, take up one-tenth of the man's time. Thus, this would reduce the time of actual work down to 432 minutes. This time, at one-tenth of the horse power, makes the total of his day's labor amount to 43.2 H.P. At this rate it is shown that it would take 2,600 strong men, working constantly, to do jointly the same amount of work in one minute as can be done by the single pound of coal.

Another line of work in which the superiority of a pound of coal is shown beside the labor of man, is that of sawing wood. A man may consider himself a swift sawyer, by making sixty strokes a minute, each stroke of the blade having progressed 5 ft. a minute, but a circular saw, driven by machinery, may be put through seventy times that distance and saw seventy times as much wood. Still, this little pound of coal has the power to keep in operation 180 such saws.—Coal Trade Bulletin.

## SHIP BUILDING NOTES.

Arthur Seitz is the name selected for a five-masted schooner building at H. M. Bean's ship yard, Camden, Me., for Capt. J. G. Crowley, Taunton, Mass. She will be launched Sept. 23.

Capt. Saunders has contracted with Cobb, Butler & Co., Rockland, Me., for a three-masted schooner of 700 tons carrying capacity. The keel has just been laid.

It is reported in Baltimore that the Structural Iron & Steel Co. of that place has been sold to influential northern interests. It is rumored that the new owners will enlarge the several departments and establish a ship yard.

A four-masted schooner, the Cordelia E. Hays, was launched from Percy & Small's yard, Bath, Me., last Saturday afternoon. She was built for J. S. Winslow & Co., Portland, Me., and her official measurements are: Length, 202.5 ft.; breadth, 40.3 ft.; depth, 18.7 ft. This is the eleventh vessel built by Percy & Small since they started in business in 1894.

The Neafie & Levy Ship & Engine Building Co., Philadelphia, Pa., is building for the Weems Steamboat Co. a single-screw freight and passenger steamer of the following dimensions: Length over all, 190 ft.; beam, molded, 40 ft.; depth to top of beam at center, 11 ft. 6 in. from base; depth from bottom of bar keel, 8 ft., with 200 tons of freight and 60 tons of coal in bunkers. The steamer is designed for a speed of 13 statute miles per hour. The machinery is to consist of one compound surface condensing engine of the vertical, inverted type, driving one propeller, with cylinders of 20 and 40 in. diameter by 28 in. stroke, arranged fore and aft with cranks set at right angles with each other. All pumps are to be independent. The centrifugal pump is to be of the Neafie & Levy improved type, driven by an independent engine. There will be one boiler of Scotch type, 14 ft. 9 in. diameter by 12 ft. long, fitted with four corrugated furnaces of 43½ in. outside diameter, two combustion chambers 40 in. deep, one to each pair of furnaces, and about 340 3-in. tubes, each 8 ft. 9 in. long. The vessel is to be equipped throughout with all marine improvements to make a first-class freight and passenger steamer for Chesapeake bay service. The Review will shortly publish a profile of this vessel.



### TOYO KISEN KAISHA.

MORE EVIDENCE OF PROGRESS IN JAPAN'S MERCANTILE MARINE—ANOTHER OF THE JAPANESE LINES THAT BEARS CLOSE RELATIONS TO COMMERCE WITH THE UNITED STATES.

An article elsewhere in this issue deals with the development of the Japanese steamship organization known as Nippon Yusen Kaisha and with the rapid progress that is being made generally of the Japanese mercantile marine. Through the courtesy of Mr. Wm. H. Avery of San Francisco, general agent of the Toyo Kisen Kaisha (Oriental Steamship Co.), we are enabled to present an illustration of one of the steamships of that organization. The Toyo Kisen Kaisha, operating a line of steamers between the United States, Japan and China, is a Japanese corporation, organized in July, 1896. The steamers in its service were built in England and delivered to the company in the fall of 1898. There are three steamers at present in the line, namely, Nippon Maru, Hong Kong Maru and America Maru, all duplicates and all built of steel, being twin screw with a speed of 17 knots. They are modern in all respects and classed up to the highest rating in Lloyds. Each of the accommodations for 105 first-class passengers. The pioneer ship of the line, the Nippon Maru, sailed from Hong Kong on her initial voyage in December, 1898, arriving at San Francisco in January, 1899.

In addition to the steamers running in the trans-Pacific line this company owns two other iron vessels of 3,500 tons each, both of which are engaged in the coast trade in Japan. Plans have recently been completed for the construction of two 12,000-ton, twin-screw steamers, which will be up-to-date ships in every particular, equal to those now crossing the Atlantic and capable of maintaining a speed of about 20 knots. It has not yet been decided just where these vessels will be built, but this matter will be settled in the near future.

As the three ships above referred to are in nearly all respects duplicates, a brief description of the America Maru will serve for all. The Nippon Maru and Hong Kong Maru were built by Sir James Laing at Sunderland, England, and the America Maru by Swan & Hunter at Wallsend-on-Tyne. The building of the ships was supervised by Baggalley & Johnson of Liverpool and London, who are well known among the skillful naval architects and marine engineers of the world, and in addition to the requirements of the ship classification societies the construction was in accordance with rigid demands of the Japanese government. The America Maru is 440 ft. long, 50 ft. beam and 32½ ft. depth, and her gross tonnage is 6,000. Her twin screws are driven by two sets of triple expansion engines, which are furnished with steam from one single-ended and four double ended boilers, with auxiliary boiler in reserve. The five active boilers are capable of developing through the engines 7,500 H.P. Water tight compartments independent of each other and cellular double bottom are features of safety in hull construction. The cabins are situated on the upper and bridge decks, where their occupants are given charming views and freed from the incident of life aboard ship. Electric light is used everywhere, and with large refrigerating plants and other modern appliances the vessels are in all respects equipped in accordance with the best modern practice for passenger ships.

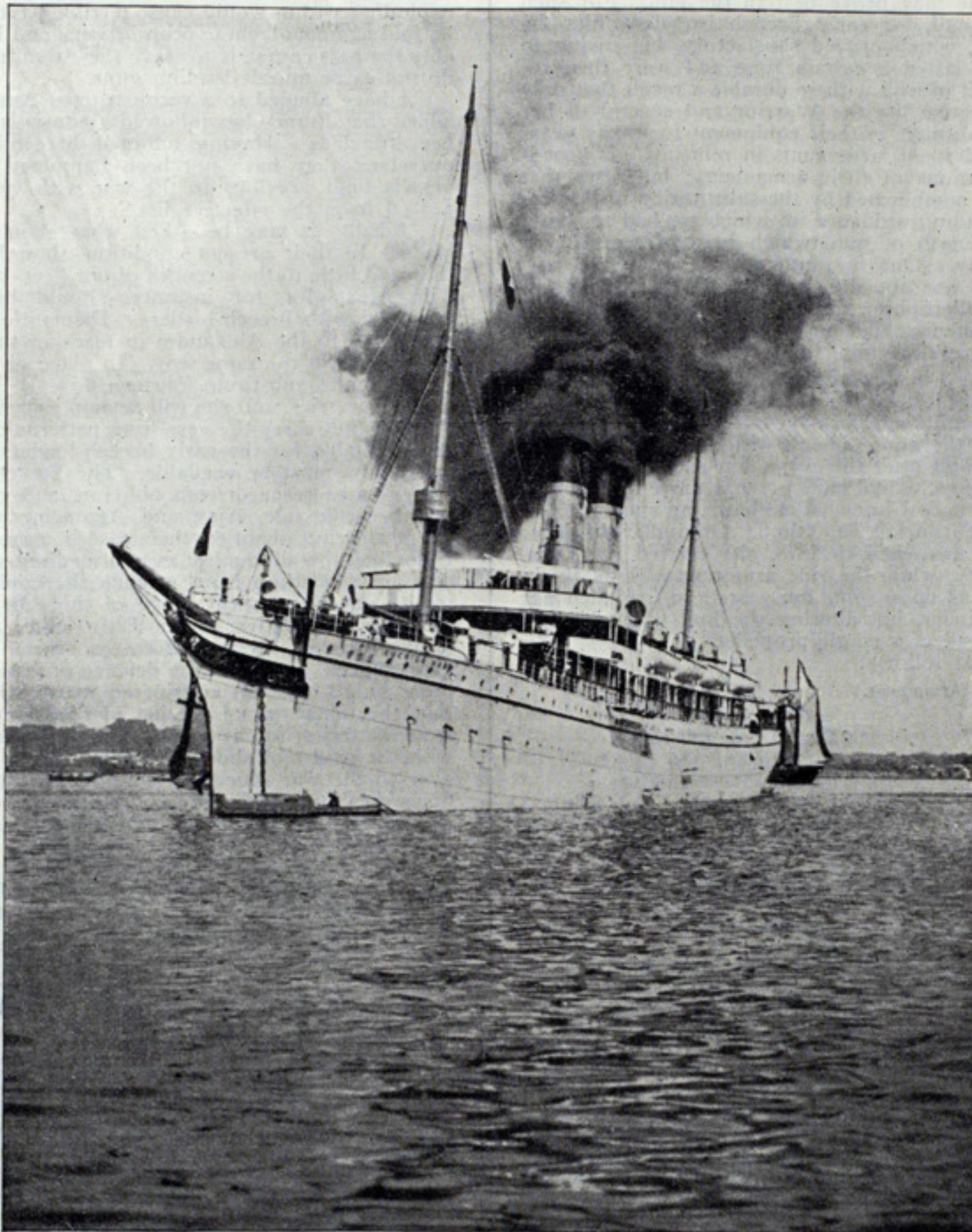
### ACTIVITY OF GERMAN MANUFACTURERS.

The activity of German manufacturers and exporters is illustrated by some figures regarding the imports of pig iron into Germany and the exports of iron and steel manufactures, which have just reached the treasury bureau of statistics. They show that the importations of pig iron increased from 462,000 tons in 1897 to 830,000 in 1900, and those of rough ironware, from 43,000 tons in 1897 to 73,000 tons in 1900; while the exports of iron and ironware increased during the same period from \$82,000,000 value to \$118,000,000; machines, from \$30,000,000 to \$45,000,000;

rolling stock and ships (not wood), from \$3,000,000 to \$9,000,000; making the total increase in these three items of iron and ironware, machines, rolling stock and ships from \$114,000,000 to \$172,000,000 in a period of three years. Exportations of machines, chiefly of cast iron, increased from 118,100 tons in 1897 to 167,000 tons in 1900; those of wrought iron, from 22,000 to 38,500 tons; boilers, from 4,400 to 5,400 tons; carding machines and their clothing, from 270 to 500 tons; while locomotives and locomobiles fell from 13,200 to 12,300 tons. On the other hand, imports have also grown. Those of iron and ironware increased from \$17,000,000 in 1897 to \$30,000,000 in 1900; machines, from \$10,000,000 to \$19,000,000; machines, chiefly of cast iron, from 51,500 tons to 69,400 tons; those of wrought iron, from 6,600 tons to 15,300; and those of wood, from 3,900 to 4,500 tons; while locomotives and locomobiles increased from 3,040 to 4,300 tons, and sewing machines from 3,030 to 4,200 tons.

The importation of pig iron was chiefly from the United Kingdom, being in 1899 670,000 tons from the United Kingdom and 30,900 from the United States. The growth from 1897 to 1899 was chiefly in that imported from the United Kingdom, the increase from that country being 140,000 tons, while from the United States was only a little more than 1,000 tons.

The great increase of importations of tin-plates in 1899 has receded, and the exportation is much larger than in former years. The imports amounted to 11,600 tons in 1897, to 10,900 tons in 1898, to 23,800 tons in 1899, and to 18,200 tons in 1900. The imports of malleable iron (iron or steel, rolled or cast) in bars, tyres, plough-shares, etc., increased from 29,500 tons in 1897 to 37,800 tons in 1900. The exports of these articles have decreased from 247,000 tons in 1897 to 173,000 tons in 1900. In the years 1897 and 1900 rough iron figured for imports at 4,800 and 7,400 tons, and for exports at 107,000 and 94,000 tons respectively. In very rough ironware the imports have dropped, rough cast-iron goods from 25,600 tons in 1899 to 21,600 tons in 1900, and tubes and pipes (rolled and forged) from 22,300 to 20,300 tons. Exports, however, increased; bridges and parts thereof from 6,300 to 9,000 tons, rough wrought-iron parts of machines from 1,900 to 2,970 tons, railway wagon axles and wheels, etc., from 41,000 to 47,000 tons, and tubes and pipes (rolled and forged) from 32,000 to 40,000 tons. In fine cast-iron and wrought-iron goods the exportation rose from 23,600 to 30,300 tons, especially in sewing machines without stands and in needles and in parts of clocks and watches. The exportations of machines have steadily risen, in spite of increased competition in the world's markets, namely, from 167,000 tons in 1897 to 235,000 tons in 1900. The importation in the latter year was nearly 100,000 tons, valued at about \$19,000,000; it was \$17,000,000 for 70,000 tons four years ago.



AMERICAN MARU OF THE TOYO KISEN KAISHA.

Built by Swan & Hunter, Wallsend-on-Tyne.

A report from Mr. Eugene T. Chamberlin, United States commissioner of navigation, again shows the liberality of the United States government in the matter of tonnage taxes collected from vessels as against expenditures of the light-house institution. Tonnage tax receipts during the last fiscal year amounted to \$903,139, the largest annual total since the change of the law in 1884. The tax rates, however, are lower than those in the principal British and German seaports. From corresponding light dues Great Britain received \$2,421,903, and expended on its light house and buoy system \$2,393,142. The appropriations for the light house service of the United States were \$3,894,591. American vessels paid only \$67,704 tonnage taxes, the number engaged in foreign trade, chiefly with nearby ports, being very small. British vessels paid \$559,357. Steam vessels paid \$755,991, sail vessels \$146,857, and \$291 were collected as penal taxes. At New York the collections were \$294,120. At Honolulu \$22,160 were collected, an amount about equivalent to the total increase over the previous fiscal year.

Mr. F. B. Swan, representing Armstrong, Whitworth & Co., the famous ship builders of Newcastle-on-Tyne, is in Halifax to determine the advisability of locating a ship yard there as a branch of the home establishment. The city of Halifax has offered a bonus of \$200,000 for a ship yard to be located within its limits.



## MODERNIZING IRONCLADS.

By Rear Admiral S. Eardley Wilmot of the British Navy.

In the maintenance of a war fleet—and I take it also with one for commerce—there is no more difficult question to decide than the time when reconstruction with individual vessels is necessary, and the extent to which it should be carried. This is especially applicable to ironclads constructed when modern fleets were in the experimental stage. Forty years ago France adopted a different system from our own; the hulls of her vessels were built of wood, ours of iron. The advantages and disadvantages of each system were stated in a memorandum by Sir Spencer Robinson at the beginning of 1863, which it is unnecessary to give fully here; but independent of cost—the saving then of using wood instead of iron being about £20,000 in a 4,000-ton vessel—the greater durability of iron was at that stage of naval construction rather a disadvantage in the eyes of that eminent French naval architect, M. Dupuy de Lome. He had imagination, or the intuition, to foresee that naval architecture, under the influence of rifled guns, shell and armor, would develop in some marked degree, though the extent was not immediately discernible. Durability, he said, may not be an advantage if the structure becomes obsolete; a cheaper and less durable article may prove best in the end. For such reasons he preferred a wood hull, for early French ironclads like the *Gloire*, *Magenta* and *Solferino*, which proved satisfactory, but owing to the nature of their hulls only lasted a certain time and were then replaced by new vessels. We built of iron with so durable a result that only recently we struck off the effective list the *Warrior* and several of her successors, though hopelessly obsolete in their equipment for many years previously. Up to 1880 we had spent large sums in refitting our broadside ironclads and in modifications of their armaments; but after that date the question became more complicated by the substitution of breech-loading guns for the muzzle-loading ordnance, to which we had too long clung, and by the increased length of gun, which became requisite in order to obtain higher velocity. Our first attempt to apply the new weapon to a broadside ironclad was not altogether successful. In 1884 it was decided to re-arm the *Bellerophon*, a broadside ironclad of 7,600 tons, completed in 1866. She then carried ten 9-in. muzzle-loading guns in her battery and four 7-in. muzzle-loading outside.

The new armament was ten 8-in. breech-loading guns in the battery and four 6-in. guns outside, besides smaller pieces. The result was an increase of weight, which brought her ports nearer to the water than before, and thus made working the guns difficult with the ship rolling or in a sea-way. It is easy to be wise after the event, but six 8-in., or even a complete armament of 6-in. guns, would have given a more satisfactory result. The most successful instance I know of modernizing such a vessel is that of the Austrian broadside ironclad *Tegetthoff*. Of similar displacement to the *Bellerophon*, and launched in 1878, she carried six 11-in. Krupp guns in a central battery, while the side armor was 14 in. thick. Her reconstruction, when decided upon some ten years ago, included not only new armament and machinery, but altering the hull to enable the vessel to have two screws instead of a single propeller.

These guns were in detail as follows:

Armament.	
Old.	New.
Six 28 cm. guns (25 cal.).	Six 24 cm. (35 cal.).
Six 9 cm. Uchatius.	Five 15 cm. (35 cal.).
Three 7 cm. Uchatius.	Two 7 cm. Uchatius.
Nine 47 mm. Hotchkiss.	Fifteen 47 mm. quick-firing.
Two 25 mm. Nordenfellt.	Two 8 mm. machine.
Machinery.	
Old.	New.
One screw.	Two screws.
Nine box boilers.	Eight cylindrical.
Pressure, 30 lb.	Pressure, 165 lb.
One low-pressure compound.	Two triple expansion.
Horse power, 5,860.	N. D. 7,340. F. D. 8,950.
Revolutions, 65.	N. D. 118. F. D. 125.
Speed, 14 knots.	Speed, 15 knots.

This reconstruction took over two years to effect, and the total cost of it was £158,000. The general result was to prolong the life of a useful vessel considerably, and one cannot but commend the thorough manner in which the question of reconstruction in this case was dealt with. How different our procedure. We have in the *Hercules*, *Sultan* and *Alexandra* vessels worthy of similar treatment, but we deal with them in such a manner that little benefit accrues. Take the *Hercules*. She had originally for an armament eight 10-in., two 9-in. and four 7-in. M. L. guns. Her re-armament consisted in taking out two 7-in. guns, and adding two 6-in. and six 4.7-in. breech-loaders, a motley collection of pieces, which reminds one of a stage ruffian with every weapon of an armory on his person. Opportunity might have been taken when refitting the *Sultan* after her immersion in Gozo channel to substitute modern guns for those on board, but apparently we could not afford the few additional thousands this would entail, and she remains armed with prehistoric ordnance. The *Alexandra*, best of the three, and even now regarded with favor by many officers, has a mixed armament like the *Hercules*, with all its drawbacks of complication of ammunition, stores and training, which alone should turn the balance in favor of complete instead of partial re-armament. When we come to the early turret ships we see the *Devastation* and *Thunderer* with their efficiency much increased by the substitution of 10-in. breech-loaders for their muzzle-loading guns, but we marvel why the same has not been carried out in the *Dreadnought*, the best of the trio and of similar design. We spend £100,000 on alterations to the *Monarch*, but send her to the cape with guns and mounting of ancient construction, and incapable of accurate shooting. Armed with 9.2-in. breech-loaders she would not as now serve as sport to a hostile cruiser selecting her distance and making of this historic craft a target for her light long-range guns.

Much has been said about the defects of the Admiral class, their want of armor on the secondary battery, and at their ends. Many suggestions have been made for the reconstruction of these battleships, but after much consideration I can see no way of improving them, except at such a cost as induces one to think the money could be more advantageously employed. To begin with, these vessels are already so low in the water

that the first improvement desirable is to give them at least 2 ft. higher free board. To effect this a removal of weight, not an addition of armor, is required. I do not know exactly the weight which corresponds to an inch of immersion, but probably it is sufficiently accurate to put it at 42 tons. That is, every 42 tons added sinks the vessel an inch, consequently to bring her up 2 ft. we must remove 1,000 tons of material. It may be in the form of coal or armament, or a combination of each, but even if we are content to let the ships remain—as regards immersion—in their present condition, to give substantial armor protection to the battery we must obtain the necessary weight in the same manner. Some have suggested removing the 67-ton guns, and replacing them with 29-ton guns, by which, with difference of weight in mountings and ammunition, we should save, and have for disposal, say, 300 tons. This would not go far in side armor. It is thus evident that much more would be required to obtain sufficient weight for material improvement in these ships. We might remove barbettes and heavy guns altogether, and substitute 9.2-in. ordnance at the ends, or take out the 6-in. guns and leave these vessels with a simple armament of four very heavy guns, with which in the early turret ship days we were quite satisfied. Why take out the secondary armament? Because it is absolutely unprotected, and a single large shell exploding within would cause terrible havoc. There is doubtless much to be said against all these propositions, and hence my conclusion that probably the best course is to leave the Admiral class alone. At any rate, they do not carry muzzle-loading guns.

I have alluded to a reconstructed Austrian battleship, and it may be added that France has followed a consistent policy of reconstruction with her ironclads. Having adopted breech-loading ordnance previous to ourselves, they have not been hampered in the same way, while their vessels built previous to the war with Germany have long since disappeared from the effective list.

Finally, it may be asked what should be done with our old ironclads? In their present condition, though figuring on the effective list, they add little to the strength of our fleet, but several are worth re-arming. The *Alexandra*, for instance, should be wholly instead of partially equipped with breech-loaders. Dismantle the *Bellerophon* and give her 8-in. guns to the *Alexandra* in place of the 10-in. muzzle-loaders. Treat the *Superb* in the same way. In place of the miscellaneous armament of the *Hercules* substitute fourteen 6-in. B. L. guns for the muzzle-loaders she now carries, and she will remain a useful vessel for some years. These ships cannot carry the very long patterns of ordnance now in use, but are quite suitable for the early breech-loaders we constructed, and of which many now must be available. The *Temeraire*, with her thick armor deserves to be rescued from oblivion, and given a modern armament. As for the *Inflexible*, *Ajax* and *Agamemnon*, with slow speed and indifferent steering qualities, their case is more doubtful. But what could the *Inflexible* now do against even a medium-sized cruiser? The latter would take up a position from whence she could shell the leviathan with impunity out of practical range of those 80-ton guns, which require close range to be effective. Even 9.2-in. guns in the *Inflexible's* turrets would be more useful, for in that case a cruiser has only the advantage of superior speed, and lacks the defence in armor the other carries. If, on the other hand, it is not considered worth while to re-arm these vessels, let them be taken out of the list of battleships and be classed as coast defence batteries, for as now equipped we can only consider them as forts with the power of shifting their position. They might, in fact, be turned over to the war office, on whom rests the defence of harbors and now mans the Spithead forts, has a flotilla of boats for submarine mining, and is credited with a desire to extend its functions on the sea. At any rate, the time has arrived when the question of all these vessels should be considered, and if a return is rendered to parliament showing that we have fifty completed battleships it should contain the further assurance that they are effective, or as effective as it is possible to make them, instead of the bare announcement that the names are those which appear in the official list. This hitherto has been no guarantee of efficiency.

## SCHERZER BRIDGE INTERESTS IN RUSSIA.

On Thursday of this week Mr. E. O. Gagen sails on the Hamburg-American line steamship *Fuerst Bismarck* for Hamburg, Germany, from which port he will proceed to Russia as a special representative in the Russian empire of the Scherzer Rolling Lift Bridge Co. of Chicago. The Russian government has been and is now improving a number of the large rivers within the empire, so as to receive ocean vessels. It is also enlarging and modernizing its ancient canals, and has entered upon the construction of several ship-canals, which will ultimately form connecting links for the transport of ocean steamships and war vessels, entirely within the empire of Russia, from the White sea to the Baltic sea, from the Baltic sea to the Black sea, and from the Black sea to the Caspian sea.

The advantages of the Scherzer type of bridge for these great river and canal improvements were brought to the attention of the Russian officials and engineers who visited the United States several years ago with a view of studying and adopting in Russia the most approved methods of railroad, waterway and canal constructions, and the interests of the Scherzer company within the Russian empire have since become so extensive as to require the establishment of permanent general offices at St. Petersburg. Mr. Gagen is a subject of the Russian empire, who has, for a number of years, been connected with Russian consulates and has made an extensive study of American institutions, engineering and business methods. After visiting all of the important seaports and waterways of Russia, Mr. Gagen will return to the United States by way of the Trans-Siberian and Chinese Eastern railroads.

In Japan Mr. Gagen will visit a number of the principal cities and seaports, with a view of further developing the business of the Scherzer company already established in Japan. It is expected that his mission will take about a year and that he will return by way of the Pacific route to Chicago.

Major W. L. Fisk, corps of engineers, U. S. A., who is in charge of all matters pertaining to the correction and publication of charts of the so-called army kind on the great lakes announces the issue of three new charts, all in colors. One is of the harbor of Duluth, Minn., and Superior, Wis., another is Maumee bay and river, including Toledo, and the third is Sturgeon Bay canal and river.



### COLORADO FUEL AND IRON CO.

Mr. J. D. Whelpley contributes to the Boston Evening Transcript an article upon the Colorado Fuel & Iron Co. which is extremely interesting because general knowledge regarding this large corporation is wanting. It was constantly referred to in the newspapers when the formation of the United States Steel Corporation was in progress. There was some talk of its ultimate incorporation into the Steel Corporation, but it would seem to be geographically excluded. It certainly has a market all its own since freight is naturally a large item in the steel business.

High up on the list of stocks posted in every broker's office, and in the columns of every newspaper, stand "C. F. & I." Men have bought and sold it in thousands of shares, with no idea of what this legend really stood for, except that in a general way it meant "Colorado Fuel & Iron." As to where this corporation was, where it operated, that it did not warrant these great transactions, has been no concern of the gambling public. The fluctuations in C. F. & I. stock have been violent. It has never had a strong supporting influence behind it. A majority of the stock has been held by men who were practical business men and had confidence in their property, but who were in no way concerned with the stock market. C. F. & I. therefore has been a football, constantly on the move and a perpetual source of surprises. In 1893 the stock was as low as sixteen cents on the dollar. Within three months past it has been 122; today it hovers between 90 and 100, as the influence of general market conditions may decree.

The Colorado Fuel & Iron Co. is the greatest industry west of the Mississippi, and with a logical future before it which will bring in time to the entire country a clearer idea of what it represents than now prevails. It is not a trust, nor is it one of those intangible corporations which operate giant plants worth millions of dollars, yet have no property of their own. This company now owns and controls nearly 400,000 acres of coal land and 5,000 acres of iron ore. With its great steel works at Pueblo, Col., it is making a second Pittsburg of that city. It employs 15,000 men, representing, with their families, one-tenth of the population of Colorado. The income of this company last year was \$13,000,000, and its expenditures a trifle over \$10,000,000. It takes over \$500,000 every month to satisfy the demands of the payroll.

Commencing at Sunrise, Wyo., its properties form a chain 1,200 miles long to Fierro, N. M. The links of this chain are twenty-eight coal mines, nine coking plants with 2,500 ovens, and at Pueblo, Col., and Laraine, Wyo., the only steel plants between the Mississippi river and the Pacific coast. In addition to these industrial concerns the company owns 80,000 acres of grazing land and about 2,000 of the town lots in the city of Pueblo. In addition to furnishing a vast tonnage for several transcontinental railways, the company operates 100 miles of railroad of its own. From the coal mines the C. F. & I. marketed last year over 4,000,000 tons of coal, or 70 per cent. of the entire production in Colorado. This year it will mine 7,000,000 tons. Last year it produced 500,000 bushels of coke, or 95 per cent. of the product of the state, and hundreds of new coke ovens are now in process of construction. From its steel mills 728,000 tons were marketed, and orders were refused for over 250,000 tons more.

The C. F. & I. has grown to what it is with a capital of \$25,000,000. It has recently increased this capitalization to \$40,000,000 by the issue of \$15,000,000 in 5 per cent. bonds, with a like issue of common stock to redeem them on demand. This \$15,000,000 is to be spent at Pueblo enlarging the steel plant to a capacity of 1,500,000 tons of finished product each year. The new manufactures are to be tin-plate sheets, wire nails and other profitable products of like character. These new mills will, it is estimated, increase the value of the output of the company by 200 per cent. On a conservative estimate the physical plant of the C. F. & I. company is estimated to be worth \$25,000,000 at the present day, and the \$15,000,000 to be realized is yet to be expended on construction.

This company is not affiliated in any way with the Steel Corporation, and is protected from it in its operation by a thousand miles of railhaul on every side. The Oriental trade is already cutting some figure in its receipts, and great developments are expected in that direction. The interstate commerce commission has given Colorado the benefit of her geographical situation in this respect, for it has ruled that the rates to the Pacific coast need never be more than 75 per cent. of the rates from Chicago to the Pacific coast, and in such a product as steel the freight rate figures largely in all bids for contracts.

The future of this great industry, so important to the west, seems already assured, for last year's orders for steel were refused, owing to limited capacity, which would have brought the total output to 1,000,000 tons. With a physical plant equal in value to its capitalization, fixed charges amounting to less than \$500,000 per year, and ample sinking fund to tide over emergencies, such as strikes, etc., the enterprise presents an interesting contrast to the hugely watered concerns recently organized east of the Mississippi. With a profit of \$2 per ton on its steel output next year, the C. F. & I. company can pay 6 per cent. on its \$38,000,000 of common stock. On the same basis the Steel Corporation must clear \$8 per ton to pay the same rate of interest. The profits on steel are now \$10 per ton or over, and at these figures the possibilities of this Colorado plant become bewildering. With the capacity which will be given by improvements now under way, and in a year of good business and high prices, the C. F. & I. company can figure upon \$11,000,000 profit in its operations, \$2,500,000 from its coal mines and \$8,500,000 from its steel works.

The C. F. & I. is essentially a western enterprise. Its stock is widely scattered, but a majority is held by men who are operating the plant, and who have confidence in the relations such an enterprise may bear in time to the rapidly populating and developing western states and territories. John W. Gates, John Lambert, J. J. Mitchell, all of Chicago, and the officers of the company, all Colorado men, are the principal stockholders. Some of these men firmly believe that the time is close at hand when the earnings of the company will be at least 25 per cent. upon its capitalization. One peculiar feature of this great industry is that its stock has never been supported in the market. The company was born in 1892 through the consolidation of the largest fuel company and the largest iron company in Colorado, both of which had been struggling along under difficulties for many years. The consolidation was a matter of life or death to both of them, but even then it was not until several years later that the C. F. & I. found itself, and its owners realized the destiny of their property. In the market rumors of various kinds and changing industrial conditions have sent the stock up and down, regardless of the real condition or pur-

poses of the company. Even in its great strength today there is no vast financial influence steadying this company's securities in the market, and they respond easily to buoyant or depressing influences.

The affairs of such a concern, widespread and all powerful as it is, are necessarily woven closely into the social and political life of the people of the several states and territories in which it operates. The attitude of the company toward its employees has always been more or less paternal. It has fought unionism from the start, and has been able to prevent the unionizing of the men in any of its plants in any department of the business. A great number of the men have worked for the company many years, and in its earlier days when money was not always forthcoming to pay the coal miners, the latter have waited patiently until such time as the company was able to pay. There is no fear expressed at the present time that the C. F. & I. will ever be forced into a general conflict with its employees. There is no organization among the men and there is a peculiar feeling of loyalty which comes from long continued and amicable relations.

One feature of the operation of this company is its "sociological department," which is in charge of Dr. R. W. Corwin, the chief surgeon of the company. He has been studying the social conditions of the employees and has recently organized a system of kindergartens, night schools and instruction in domestic science for the benefit of the miners and mill workers. He is familiar with the manners and customs of each of the thirty nationalities represented on the payroll of the company. He knows that what would be taken kindly by the Americans, Welsh, English and Irish at Coal Creek or Crested Butte, would not do among the negroes at Walsenburg or among the Chinese and Japanese at Gallup, New Mexico. He has found that certain innovations are a success where the different nationalities are almost homogeneous, as at Glenwood or Aspen; but are a failure at Gallup, where there are Negroes and Chinamen, Greeks and Japs, Mexicans and Russians. The work of the sociological department will not only cover instruction in schooling and domestic matters, but will include co-operation with the public schools, the holding of regular courses of lectures, the founding of libraries, reading rooms and art exhibits, the organizing of clubs and assistance in giving entertainments and social gatherings of all kinds. So far the kindergartens and night schools have proved of the most practical value. The kindergartens have been of tremendous assistance to the wives of the miners and mill men, and the night schools have been very generally taken advantage of. The company officials believe this work will repay them handsomely for the considerable amount of capital invested, and it is regarded throughout the state of Colorado as of immense importance, owing to the fact that the employees of the C. F. & I., with their families, represent a community of at least 75,000 people.

### TRADE NOTES.

The Joseph Dixon Crucible Co., Jersey City, N. J., has just issued a neat postal card bearing an imprint of the Louisville bridge of the Kentucky & Indiana Bridge & Railroad Co., which is protected with Dixon's silica-graphite paint. This paint is made in four colors, but of only one quality.

In a postscript to a recent letter to the B. F. Sturtevant Co., Boston, the F. M. Sibley Lumber Co. of Detroit, Mich., says: "The Sturtevant Exhaust Head we bought of you, last winter, is perfection itself. We are very much pleased with it. It keeps our mill roof as dry as if there were no exhaust at all."

The Hilles & Jones Co., Wilmington, Del., has issued as beautiful a catalogue as ever came from an industrial concern upon the subject of machine tools for working plates, bars and structural shapes. There are twenty illustrations of new machines which are modifications of standard designs and special attachments for punches and shears not shown in previous catalogues. The half-tones of the various machines are beautifully vignettted and are most excellently printed.

Of all the great houses which issue catalogues few can compare with Westinghouse. They come in great profusion, but each is better than the one which it succeeds. The latest is devoted to the Westinghouse exhibits at the Pan-American. This catalogue is more than an exposition catalogue. It reviews the inception and growth of the Westinghouse companies and deserves to be preserved, not alone for its beauty but its historical worth. The cover is unusually striking in red and gold.

The Rankine patent feed water filters are made in the United States by W. Blackburn Smith, Perth Amboy, N. J. They are adapted for land and marine boilers and are very generally in use in the navies of the world. The advantages of the filter are said to be these: Simplicity of construction, great filtering area, equal distribution of pressure and little or no resistance on the feed-pumps; occupies very little space in the engine room; can be cleaned or overhauled in a few minutes, and it prevents any foreign matter whatever from entering the boiler. The various makes are well set forth in the catalogue, which will be sent to anyone upon application.

Mr. W. L. McCabe of Seattle and Tacoma, Wash., has patented a portable ship and warehouse conveyor for handling freight. Mr. McCabe is now in the east introducing his conveyor for handling to shipping men. Of the conveyor Mr. McCabe says that it loads and discharges ships, lighters and barges; carries and piles sacks, bales and cases; conveys lumber, coal and brick; operates by steam or electricity; engine or motor self contained and fully protected from injury; weight so little as to permit easy and ready handling; construction simple and strong, and therefore durable; cost of operation slight. He refers to a number of Pacific coast concerns which are using it.

The Canadian Pacific Railway Co. is considering the advisability of issuing bonds to the extent of \$2,400,000 for the purpose of adding to its steamship fleet. The subject will be taken up at the next annual meeting of the shareholders.

Low Rate Excursion to New York via B. & O.—Tickets on sale daily until Oct. 20 with privilege of returning via Buffalo. Call at city ticket office, 241 Superior street. Oct. 20.

Some interesting reading matter relative to very shallow draft powerful steamboats for river navigation is mailed free on receipt of request by Marine Iron Works, station A, Chicago.



**STRENGTHENING THE NORTH ATLANTIC SQUADRON.**

Newport News, Va., Aug. 28.—The battleship Indiana, temporarily in service as a training ship for the Annapolis naval cadets, has gone to Annapolis after being at anchor in the harbor nearly a week, during which time the cadets paid a number of visits to the ship yard for observation and instruction. Com'dr Collahan was in charge of the cadets and every day during their stay they came ashore and spent hours in the workshops and aboard the several warships in different stages of advancement. The Indiana will return to Hampton Roads in a few days and after fitting out at the navy yard will again go into commission to join the North Atlantic squadron, which is now at anchor off Old Point. The squadron will soon be strengthened by the addition, also, of the battleship Illinois, which earned the distinction of queen of the navy. Rear Admiral Higginson will have under him, then, one of the most powerful squadrons ever organized under the stars and stripes, consisting entirely of battleships, as follows: Kearsarge (flagship), Alabama, Illinois, Massachusetts and Indiana. Three distinct types of first-class battleships are represented in this group—the Kearsarge carrying her main battery in superposed turrets and in broadside, the Illinois and Alabama carrying their 13-in. guns in single turrets and their other guns in broadside, and the Indiana and Massachusetts carrying all of their main battery guns in forward, aft and midship turrets.

Gen. Supt. Post, of the ship yard, has notified Secretary Long that the battleship Illinois will be ready to commission about Sept. 10. The department has not set the date yet.

It is stated that the Clark Steamship & Excursion Co. has been after the Pacific Mail liner Korea, now nearing completion, for an around-the-world excursion, but the Pacific Mail will need the new leviathan as soon as completed and will not charter it for excursion purposes.

The battleship Missouri is being delayed by the non-arrival of needed material.

The Holland-American Steamship Co. has opened offices here and will hereafter run a regular line of ships between Newport News and Holland.

Newport News is becoming an important factor in the shipment of coal abroad. For some years it has rivaled the largest of American ports in the coastwise coal trade, over 2,000,000 tons being handled on an average annually. The proposed establishment of a direct line of coal steamers between Newport News and Marseilles makes some figures of the coal business between this and foreign ports apropos and interesting. Since Jan. 1 this port has sent to Marseilles 63,915 tons of New River coal. Trieste, Austria, has received 34,747 tons from Newport News and Rio de Janeiro 27,846 tons, making a total of 126,508 tons for these three ports, which is more than the combined shipments to all other ports from Newport News. The total shipment from this port abroad for the eight months amounted to 242,819 tons, valued at nearly \$1,000,000, the balance (116,311 tons) being divided among the following ports: Malta, Monte-

video, Port Castries, Halifax, N. S., Dakar, Tampico, St. Lucia, Kingston, Pireaus, St. Johns, Genoa, Barcelona, St. George's, Para, LaPlata, Gohenburg, Havana, Buenos Ayres, Vera Cruz, Cardenas, Barbadoes, Port Columbia and La Guayra.

**IMPROVEMENT IN IRON TRADE ABROAD.**

As an evidence of the improved condition which obtains in the iron trade abroad the following from the Engineer is submitted. It is in line with what other technical journals record:

Things are going better both for masters and men in the iron trade of the kingdom. There is abundant evidence of this, and both parties are to be congratulated on the event. It is true that the accountants to the wages boards, alike in the north of England and the Midlands, have had to testify to a further reduction in the average selling price of iron during the months of May and June, but most of that business, it must be borne in mind, was booked at the low rates prevailing in the spring, and later contracts, it will be found, are on a rather more satisfactory basis. Business also is more abundant now in anticipation of the autumn requirements of consumers, and prices are trending upwards all over the country. In the west of Scotland a material change for the better has come over the industrial position, and today there are not many of the Scotch ironmasters who do not believe that if we are not assured of another lengthened period of activity, we are at least safe for months against that depression which seemed at our door so recently. Steel ship plates are up to £6, less 5 per cent., and it is said will go higher, and ship building on the Clyde is just now as prosperous as it ever has been, there being no fewer than 450,000 tons of work in hand—part of it well advanced, but the greater part in the initial stage. In the last few days orders for iron bars have been placed in the Coatbridge districts for markets which have not been customers for years. The wages ascertainment in Cleveland shows a drop of 3s. 6d. per ton for May and June, leaving the net average at £6 18s., while the production—of the associated firms only, however—dropped to 15,500 tons. But in the past six months there has been a big improvement. Ship building on the northeast coast is simply booming, and iron and steel plates and angles have advanced 5s. per ton, plates being now 10s. per ton above the late minimum. Impressed with the improved situation which has appeared, buyers are hurrying up orders, and forward buying is more apparent than for a long time past. The official wages declaration in the Midlands registers a decrease in the average selling price for May and June of no less than 8s. 6d. per ton, an item which seems at first a very large reduction, and the net average selling price has fallen to £6 19s. 2d.; but the ironmasters are already experiencing some recovery from the depression of the first half of the year, and unmarked bars and tube-making strip have both been advanced. The make for May and June exceeded 28,000 tons, an increase of 2,500 tons compared with the last statement, and the mills continue active. The Midland ironmasters are well advised in foregoing any drop in wages, and in the north previous wages are also confirmed.

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**Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.**

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895.....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900.....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
Total.....	757,503	713,637	644,784	597,423	387,519	356,376	292,683	209,514	172,182	128,730	85,950	52,140

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**WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.**

**TELEGRAPHIC ADDRESS · BELLEVILLE, SAINT-DENIS-SUR-SEINE.**



**PINTSCH LIGHTED BUOY AT THE PAN-AMERICAN.**

The illustration that appears herewith gives a good view of one end of the lake at the Pan-American Exposition in Buffalo, and it is without doubt the attractive end, for it is here that the daily exhibitions of the government life saving corps are given. In the picture may be seen two



pleasure boats, in which sight-seers may go about the lake, and the building in course of erection in the background is the Albright art gallery. The buoy which shows prominently in the forward part of the picture is one of the Pintsch lighted type. It may not be readily recognized by those familiar with the Pintsch buoy, for the superstructure is not the standard style, having been made ornamental especially for exhibition purposes. It is a standard Pintsch buoy, so many of which are

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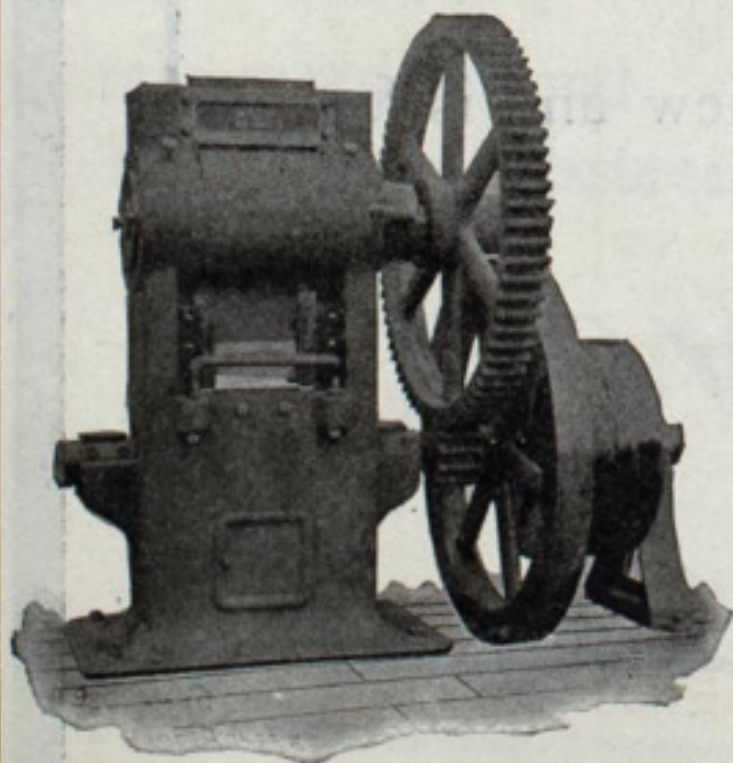
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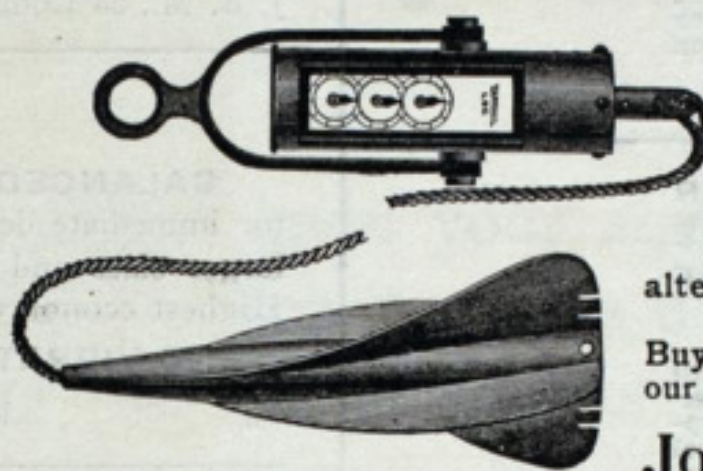
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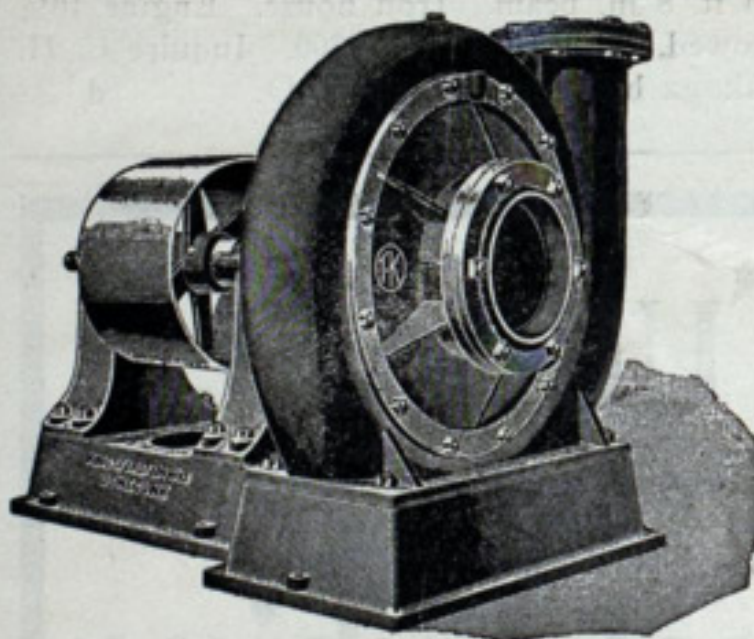
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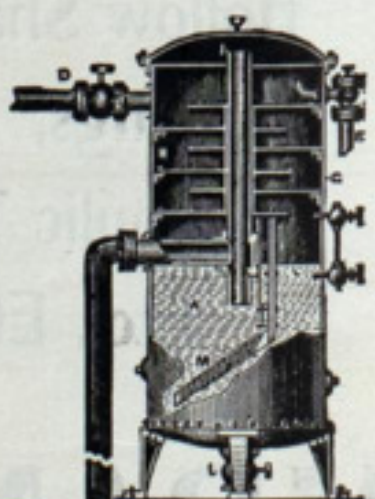
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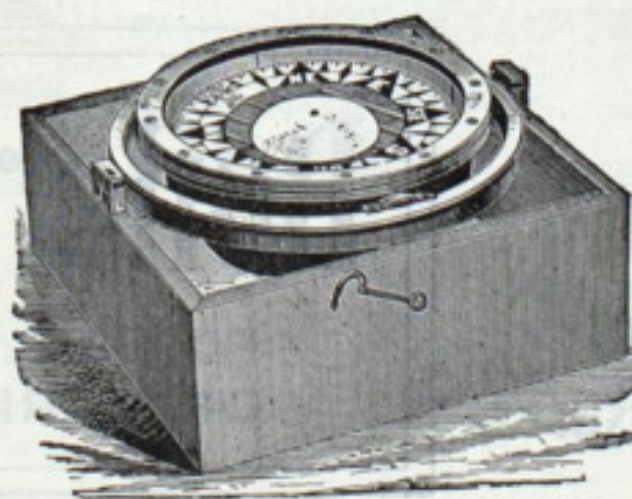
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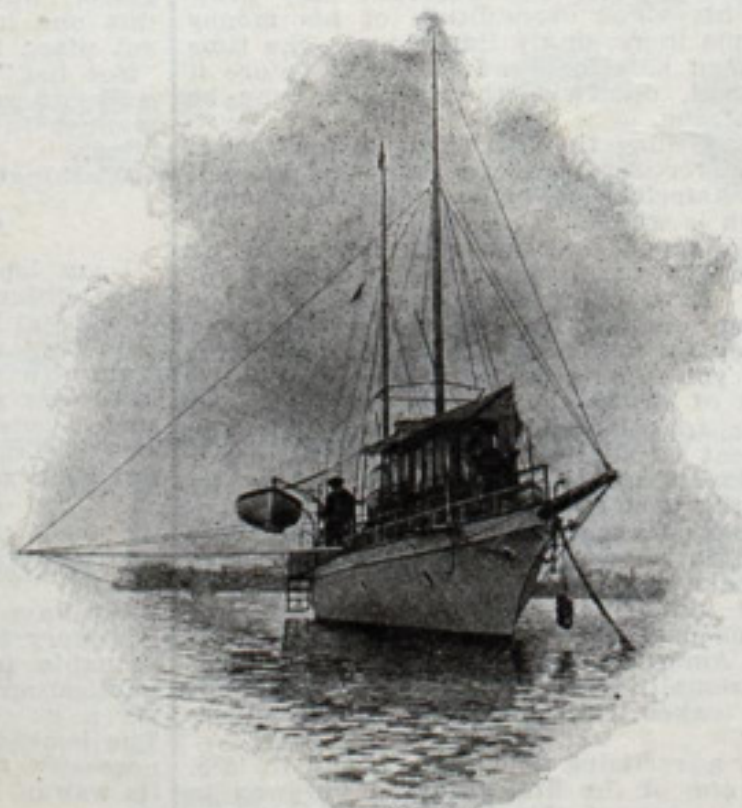
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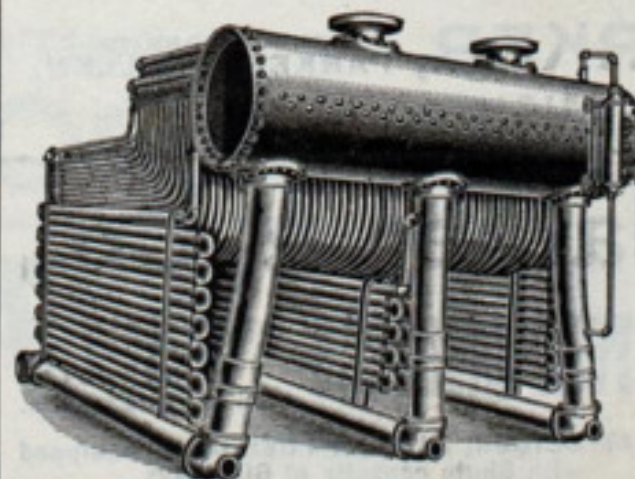
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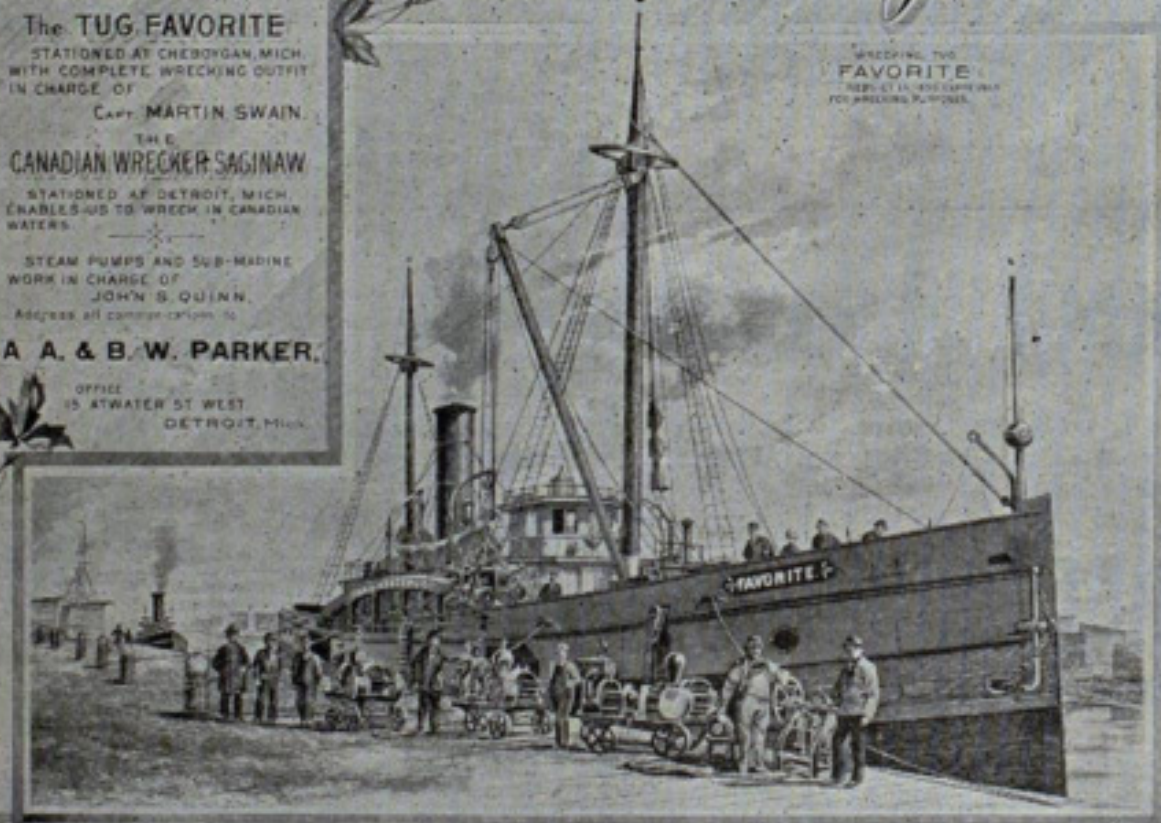


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R. V. Pierce, M. D., President World's Dis. Med. Ass'n.

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### ADVISOR.

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Charles Austin Bates.

New York, June 24, 1901.

### PABST.

If the improvement of the American Newspaper Directory continues in the future as it has during the past twenty years I do not think I shall live long enough to see any other directory take its place. There will, however, be the usual crop of directories, just as every other good thing is imitated. Your long years of experience in dealing with evasive circulation reports have most admirably fitted you for placing a proper valuation upon such statements. Advertisers have come to know that the Rowell estimates are nearer the proper figure than can otherwise be obtained. The American Newspaper Directory is therefore indispensable in every well regulated advertising department. Lines are being more tightly drawn every day; it is difficult to collect for twenty thousand when you print only eight. If the advertiser were buying barley he would not accept three pecks for a bushel, although the quality might at all times be open for discussion. The American Newspaper Directory is the guide and companion of the advertising man, and it is to the interests of all concerned to help perfect it, support it and hurrah for it.

Pabst Brewing Co.,

J. R. Kathrens, Adv. Mgr.

Milwaukee, Wis., June 7, 1901.

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Artemas Ward,

Advertising Manager for Sapolio. —In Fame, March, 1901.

### WASHINGTON.

Every page of the American Newspaper Directory breathes the desire of its publishers that it shall be absolutely correct in every statement it makes.

Truly yours, Frank Roe Batcheld, Clerk of the Committee on Banking and Currency, House of Representatives, U. S. Washington, D. C., Jan. 17, 1899.

### SOUTHERN.

We subscribe to and pay cash for the American Newspaper Directory, and find it of great value in our advertising department. We have 6,892 miles of railway, extending from Washington, D. C., all over the South, and in advertising this system we use more than 1,000 publications, and in selecting this list we find that we get a correct idea of circulation from this Directory that can not be obtained from any other similar publication. We receive other newspaper directories gratis; but the fact that we pay cash for this one in addition shows that we can not place the same dependence upon the "free list."

We thoroughly appreciate the careful manner in which this Directory is compiled.

Washington, D. C., Sept. 13, 1900.

Jos. H. Hennen,

Adv. Dept. Southern Railway.

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S. H. Hardwick,

General Passenger Agent.

Washington, D. C., May 21, 1901.

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## PACKING.

Crane Co.....Chicago.  
 Garlock Packing Co.....Palmyra, N. Y.  
 Jenkins Bros.....New York.  
 Katzenstein, L. & Co.....New York.  
 Sayen & Schultz.....Philadelphia.  
 U. S. Metallic Packing Co.....Philadelphia.

## PAINTS.

Baker, Howard H. & Co.....Buffalo.  
 Toch Bros.....New York.  
 Upson-Walton Co.....Cleveland.

## PATENT ATTORNEYS.

Thurston &amp; Bates.....Cleveland.

## PATTERN SHOP MACHINERY.

Atlantic Works, Inc.....Philadelphia.

## PIPE THREADING AND CUTTING MACHINES.

Merrell Mfg. Co.....Toledo, O.

## PIPE, WROUGHT IRON.

Bourne-Fuller Co.....Cleveland.  
 Crane Co.....Chicago.

## PLANERS OF ALL KINDS.

Bement, Miles & Co.....Philadelphia.  
 Niles Tool Works Co.....Hamilton, O.

## PLANING MILL MACHINERY.

Atlantic Works, Inc.....Philadelphia.

## PLATE BENDING AND PLANING MACHINES.

Bement, Miles & Co.....Philadelphia.  
 Cleveland Punch & Shear Works Co.....Cleveland.  
 Niles Tool Works Co.....Hamilton, O.  
 Wood & Co., R. D.....Philadelphia.

## PLUMBING, MARINE.

Reilly Repair & Supply Co., James.....New York.  
 Sands, Alfred B. & Son.....New York.

## PNEUMATIC TOOLS.

Standard Pneumatic Tool Co.....Chicago.

## POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.  
 Paul & Co., J. C.....Chicago.

## PRESSURE REGULATORS.

D'Este Co., Julian.....Boston.

## PROPELLER WHEELS.

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Bath Iron Works, Ltd.....Bath, Me.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Detroit Shipbuilding Co.....Detroit.  
 Farrar & Trefts.....Buffalo.  
 Fore River Ship & Engine Co.....Quincy, Mass.  
 Hardy, John B.....Tacoma, Wash.  
 Hyde Windlass Co.....Bath, Me.

Harlan & Hollingsworth Co.....Wilmington, Del.  
 Hodge, S. F. & Co.....Detroit.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 MacKinnon Mfg. Co.....Bay City, Mich.  
 Maryland Steel Co.....Sparrow's Point, Md.  
 Moran Bros. Co.....Seattle, Wash.  
 Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.  
 Newport News Ship Building Co.....Newport News, Va.  
 Nixon, Lewis.....Elizabeth, N. J.  
 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.  
 Pusey & Jones Co.....Wilmington, Del.  
 Risdon Iron Works.....San Francisco.  
 Sheriffs Mfg. Co.....Milwaukee.  
 Trigg, Wm. R. Co.....Richmond, Va.  
 Trout, H. G.....Buffalo.  
 Union Iron Works.....San Francisco.

## PROJECTORS, ELECTRIC.

Badt-Goltz Engineering Co.....Chicago.  
 Elwell-Parker Electric Co.....Cleveland.  
 General Electric Co.....Schenectady, N. Y.  
 Rushmore Dynamo Works.....Jersey City, N. J.  
 Seidler-Miner Electric Co.....Detroit.  
 Westinghouse Electric & Mfg. Co.....Pittsburg.

## PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co.....New York.  
 Kingsford Foundry & Machine Works.....Oswego, N. Y.  
 Wood, R. D. & Co.....Philadelphia.  
 Worthington, Henry R.....New York.

## PUNCHES, RIVETERS, SHEARS.

Bement, Miles & Co.....Philadelphia.  
 Cleveland Punch & Shear Works Co.....Cleveland.  
 Niles Tool Works Co.....Hamilton, O.  
 Wood, R. D. & Co.....Philadelphia.

## REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register.....Cleveland.

## RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co.....New York.

## RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co.....Cleveland.  
 Champion Rivet Co.....Cleveland.

## R. I. W. DAMP RESISTING PAINT.

Toch Bros.....New York.

## RIGGING ROPE (WIRE).

American Steel &amp; Wire Co.....Chicago.

## RUBBER GOODS.

Hale Rubber Co., Alfred.....So. Boston, Mass.

## RUBBER INSULATED WIRES.

Roebbing's Sons, John A.....New York and Cleveland.  
 American Steel & Wire Co.....Chicago.

## SAFETY VALVES.

American Steam Gauge Co.....Boston.  
 Ashton Valve Co.....Boston.  
 Crosby Steam Gage & Valve Co.....Boston.

## SAIL MAKERS.

Baker, Howard H. & Co.....Buffalo.  
 Upson-Walton Co.....Cleveland.  
 Wilson & Silsby.....Boston.

## SALVAGE COMPANIES.

See wrecking companies.

## SEAM COMPOSITION AND ELASTIC SEAM PAINT.

Cole &amp; Kuhls.....Brooklyn.

## SEARCH LIGHTS.

Badt-Goltz Engineering Co.....Chicago.  
 Elwell-Parker Electric Co.....Cleveland.  
 General Electric Co.....Schenectady, N. Y.  
 Rushmore Dynamo Works.....Jersey City, N. J.  
 Seidler-Miner Electric Co.....Detroit.  
 Westinghouse Electric & Mfg. Co.....Pittsburg.

## SHAPERS.

Bement, Miles & Co.....Philadelphia.  
 Niles Tool Works Co.....Hamilton, O.  
 Pratt & Whitney Co.....Hartford, Conn.

## SHEARS.

See punches, riveters and shears.

## SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.....Cleveland.

## SHIP BUILDERS.

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Bath Iron Works, Ltd.....Bath, Me.  
 Buffalo Dry Dock Co.....Buffalo.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Craig Ship Building Co.....Toledo, O.  
 Chicago Ship Building Co.....Chicago.  
 Detroit Shipbuilding Co.....Detroit.  
 Fore River Ship & Engine Co.....Quincy, Mass.  
 Hardy, John B.....Tacoma, Wash.  
 Harlan & Hollingsworth Co.....Wilmington, Del.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 Maryland Steel Co.....Sparrow's Point, Md.  
 Moran Bros. Co.....Seattle, Wash.  
 Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.  
 Newport News Ship Building Co.....Newport News, Va.  
 Nixon, Lewis.....Elizabeth, N. J.  
 Pusey & Jones Co.....Wilmington, Del.  
 Risdon Iron Works.....San Francisco.  
 Roach's Ship Yard.....Chester, Pa.  
 Trigg, Wm. R. Co.....Richmond, Va.  
 Union Iron Works.....San Francisco.  
 Willard, Chas. P. & Co.....Chicago.

## SHIP CHANDLERS.

Baker, Howard H. & Co.....Buffalo.  
 Moran Bros. Co.....Seattle, Wash.  
 Reilly Repair & Supply Co., James.....New York.  
 Upson-Walton Co.....Cleveland.



## BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

## SPARS—LARGE SIZES.

Moran Bros. Co. .... Seattle, Wash.

## STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co. .... Cuyahoga Falls, O.

## STEAM VESSEL FOR SALE.

Holmes, Samuel. .... New York.

## STEAMSHIP LINES, PASS. AND FREIGHT.

Algoma Central Co. .... Sault Ste. Marie, Ont.  
 American Line. .... New York.  
 Cleveland & Buffalo Transit Co. .... Cleveland.  
 Dominion Line. .... Boston.  
 Erie & Western Trans. Co. .... Buffalo.  
 International Nav. Co. .... Philadelphia.  
 Red Star Line. .... New York.

## STEEL CASTINGS.

Seaboard Steel Casting Co. .... Chester, Pa.

## STEERING APPARATUS.

American Ship Building Co. .... Cleveland.  
 Chase Machine Co. .... Cleveland.  
 Detroit Shipbuilding Co. .... Detroit.  
 Electro-Dynamic Co. .... Philadelphia.  
 Hyde Windlass Co. .... Bath, Me.  
 Jenks Ship Building Co. .... Port Huron, Mich.  
 Queen City Engineering Co. .... Buffalo.  
 Sheriffs Mfg. Co. .... Milwaukee.

## STOCKS, BONDS, SECURITIES.

Wright, Herbert &amp; Co. .... Cleveland.

## STOCKLESS ANCHORS.

Baldt Anchor Co. .... Chester, Pa.  
 International Anchor Co. .... Cleveland.

## SUBMARINE DIVING APPARATUS.

Hale Rubber Co., Alfred. .... So. Boston, Mass.

## SURVEYORS, MARINE.

Gaskin, Edward. .... Buffalo.  
 See, Horace. .... New York.  
 Wood, W. J. .... Chicago.

## TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. &amp; Son. .... New York.

## TESTS OF MATERIAL.

Hunt, Robert W. & Co. .... Chicago.  
 Pittsburgh Testing Laboratory, Ltd. .... Pittsburgh.

## THERMOMETERS FOR MECHANICAL PURPOSES.

Helios-Upton Co. .... Peabody, Mass.

## TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Bement, Miles & Co. .... Philadelphia.  
 Cleveland Punch & Shear Works Co. .... Cleveland.  
 New Doty Mfg. Co. .... Janesville, Wis.  
 Niles Tool Works Co. .... Hamilton, O.  
 Pond Machine Tool Co. .... Plainfield, N. J.  
 Pratt & Whitney Co. .... Hartford, Conn.  
 Standard Pneumatic Tool Co. .... Chicago.  
 Watson-Stillman Co. .... New York.  
 Wood, R. D. & Co. .... Philadelphia.

## TOOLS, WOOD WORKING.

Atlantic Works, Inc. .... Philadelphia.

## TOPOPHONE—Prevents disasters in fog.

Colt Co. J. B. .... New York.

## TOWING MACHINES.

American Ship Windlass Co. .... Providence, R. I.  
 Chase Machine Co. .... Cleveland.

## TOWING COMPANIES.

Donnelly Salvage & Wrecking Co. .... Kingston, Ont.  
 Midland Towing & Wrecking Co., Ltd. .... Midland, Ont.  
 Swain Wrecking Co. .... Detroit.

## TRAPS, STEAM.

D'Este Co., Julian. .... Boston.  
 Haines Co., Wm. S. .... Philadelphia.

## TRUCKS.

Boston &amp; Lockport Block Co. .... Boston.

## TUBING, SEAMLESS.

Benedict & Burnham Mfg. Co. .... Waterbury, Conn.  
 Standard Seamless Tube Co. .... Pittsburgh.

## VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. .... Boston.  
 Ashton Valve Co. .... Boston.  
 Crane Co. .... Chicago.  
 Crosby Steam Gauge & Valve Co. .... Boston.  
 D'Este Co., Julian. .... Boston.  
 Jenkins Bros. .... New York.  
 Wood & Co., R. D. .... Philadelphia.

## VARNISH PAINT.

Mair, John &amp; Son. .... Philadelphia.

## VESSEL AND FREIGHT AGENTS.

Boland, John J. .... Buffalo.  
 Brown & Co. .... Buffalo.  
 Chamberlain & Co., S. R. .... Chicago.  
 Drake & Maytham. .... Buffalo.  
 Elphicke, C. W. & Co. .... Chicago.

Hall & Root. .... Buffalo.  
 Helm, D. T. & Co. .... Duluth, Minn.  
 Holmes, Samuel. .... New York.  
 Hutchinson & Co. .... Cleveland.  
 Keith, J. G. & Co. .... Chicago.  
 Kennedy Hunter & Co. .... Antwerp.  
 Mitchell & Co. .... Cleveland.  
 Richardson, W. C. .... Cleveland.  
 Sullivan, D. & Co. .... Chicago.  
 Tandy, Frank N. .... Boston.

## VENTILATING APPARATUS FOR SHIPS.

American Blower Co. .... Detroit.  
 Boston Blower Co. .... Hyde Park, Mass.  
 Buffalo Forge Co. .... Buffalo.  
 Sturtevant, B. F. Co. .... Boston.

## WIRE ROPE AND WIRE ROPE FITTINGS.

American Steel & Wire Co. .... Chicago.  
 Baker, H. H. & Co. .... Buffalo.  
 Roebling's Sons, John A. .... New York and Cleveland.  
 Upson-Walton Co. .... Cleveland.

## WHISTLES, STEAM.

American Steam Gauge Co. .... Boston.  
 Ashton Valve Co. .... Boston.  
 Crosby Steam Gauge & Valve Co. .... Boston.

## WINDLASSES.

American Ship Windlass Co. .... Providence, R. I.  
 American Ship Building Co. .... Cleveland.  
 Hyde Windlass Co. .... Bath, Me.  
 Jenks Ship Building Co. .... Port Huron, Mich.

## WINCHES.

American Ship Windlass Co. .... Providence, R. I.  
 Hyde Windlass Co. .... Bath, Me.

## WOOD WORKING MACHINERY.

Atlantic Works, Inc. .... Philadelphia.

## WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. .... Kingston, Ont.  
 Midland Towing & Wrecking Co., Ltd. .... Midland, Ont.  
 Swain Wrecking Co. .... Detroit.

## YACHT SAILS, FITTINGS, HARDWARE, ETC.

Wilson &amp; Silsby. .... Boston.

## YACHT AND BOAT BUILDERS.

Dreln, Thos. & Son. .... Wilmington, Del.  
 Gas Engine & Power Co. .... New York.  
 Lane & DeGroot. .... Brooklyn.  
 Willard, Chas. P. & Co. .... Chicago.

## YAWLS.

Dreln, Thos. & Son. .... Wilmington, Del.  
 Lane & DeGroot. .... Brooklyn.

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STEEL AND WOOD VESSELS, STEAM OR SAIL  
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LARGEST TOOLS AND EQUAL TO ANY REQUIREMENT  
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No. 22, Lake Shore Limited	.....	*2 15 am	*2 20 am
No. 26, Pan-American Express	.....	*5 50 am	*6 00 am
No. 28, New York & Boston Express	.....	*7 40 am	*8 00 am
No. 32, Fast Mail	.....	*11 25 am	*11 30 am
No. 44, Accommodation, via Sandusky	.....	*1 35 pm	.....
No. 46, Southwestern Express	.....	.....	*3 00 pm
No. 6, Limited Fast Mail	.....	*5 40 pm	*5 45 pm
No. 10, Chicago, New York & Boston Special	.....	*7 35 pm	*7 40 pm
No. 16, New England Express	.....	*10 30 pm	*10 35 pm
No. 2, Day Express	.....	*10 05 pm	*11 30 pm
No. 126, Norwalk Accommodation	.....	*12 55 am	.....
No. 40, Toledo & Buffalo Accom., via Norwalk	.....	*10 00 am	*11 40 am
No. 106, Conneaut Accommodation	.....	.....	*4 30 pm
Westward:—		Ar. fr. East.	Dep. West.
No. 11, Southwestern Limited	.....	*3 25 am	.....
No. 15, New York, Boston & Chicago Special	.....	*3 05 am	*3 10 am
No. 21, New York & Chicago Express	.....	*5 10 am	*5 20 am
No. 7, Day Express	.....	.....	*6 30 am
No. 19, The Lake Shore Limited	.....	*7 35 am	*7 40 am
No. 23, Western Express	.....	*11 10 am	*11 15 am
No. 33, Southwestern Express	.....	*12 25 pm	.....
No. 133, Cleveland & Detroit Express	.....	.....	*12 30 pm
No. 47, Accommodation	.....	.....	*13 00 pm
No. 141, Sandusky Accommodation	.....	.....	*13 10 pm
No. 127, Norwalk Accommodation	.....	.....	*15 10 pm
No. 37, Pacific Express	.....	*7 00 pm	*7 20 pm
No. 25, Southern Express	.....	*9 30 pm	.....
No. 3, Fast Mail Limited	.....	*10 50 pm	*10 55 pm
No. 115, Conneaut Accommodation	.....	*18 30 am	.....

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Round trip tickets to Indianapolis, Ind., will be on sale from all "Big Four" points on September 13, 14 and 15, 1901, (also on September 16th from points within a radius of 100 miles from Indianapolis), at rate of one fare for the round trip. (No fare less than 25 cents.) Tickets good for return until September 23rd, 1901. For full information and particulars as to rates, tickets, limits, etc., call on Agents "Big Four Route," or address the undersigned.

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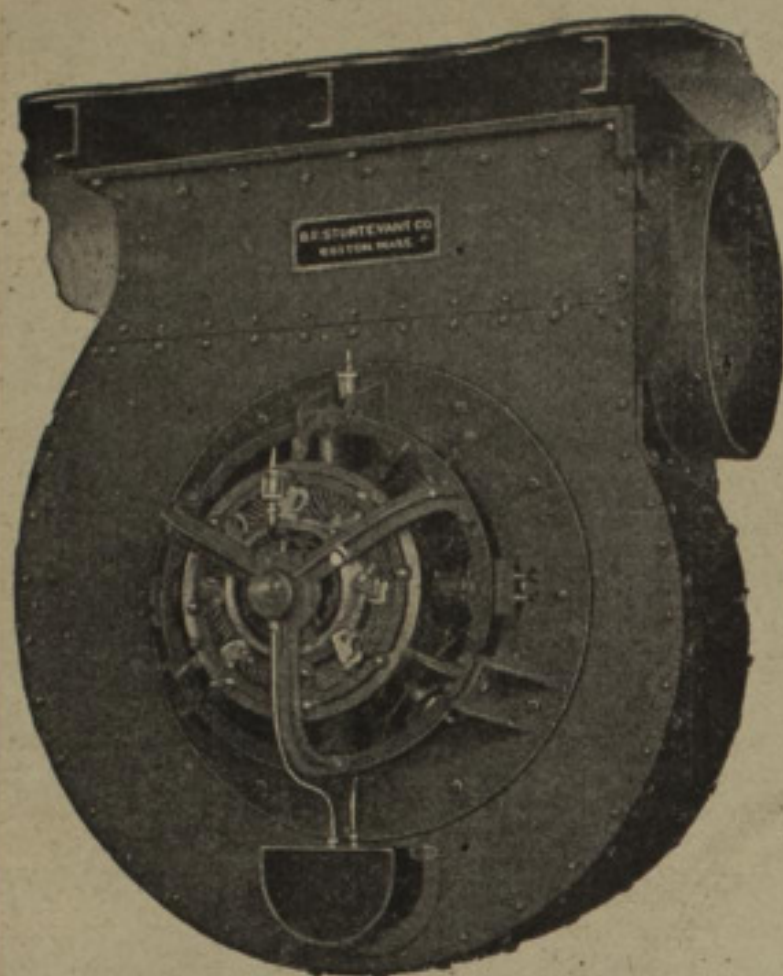
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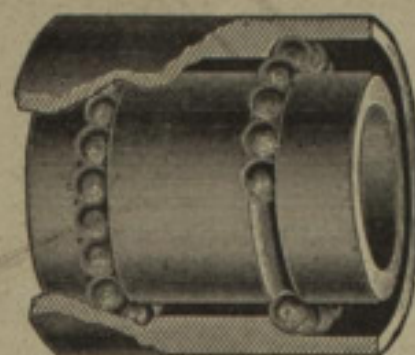
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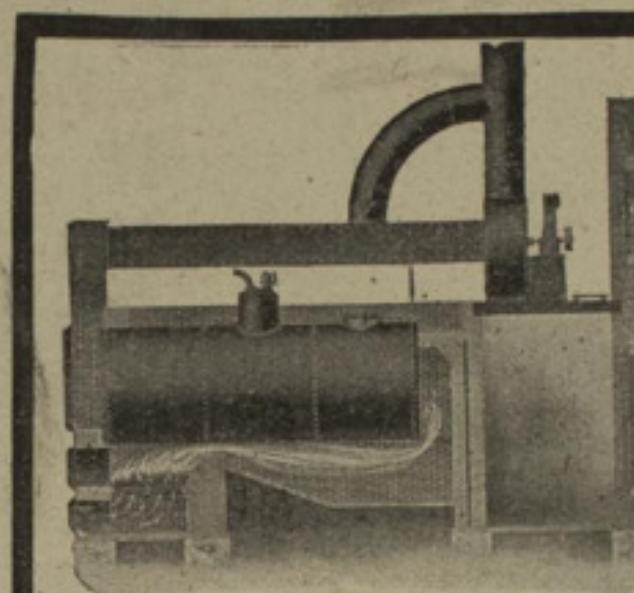
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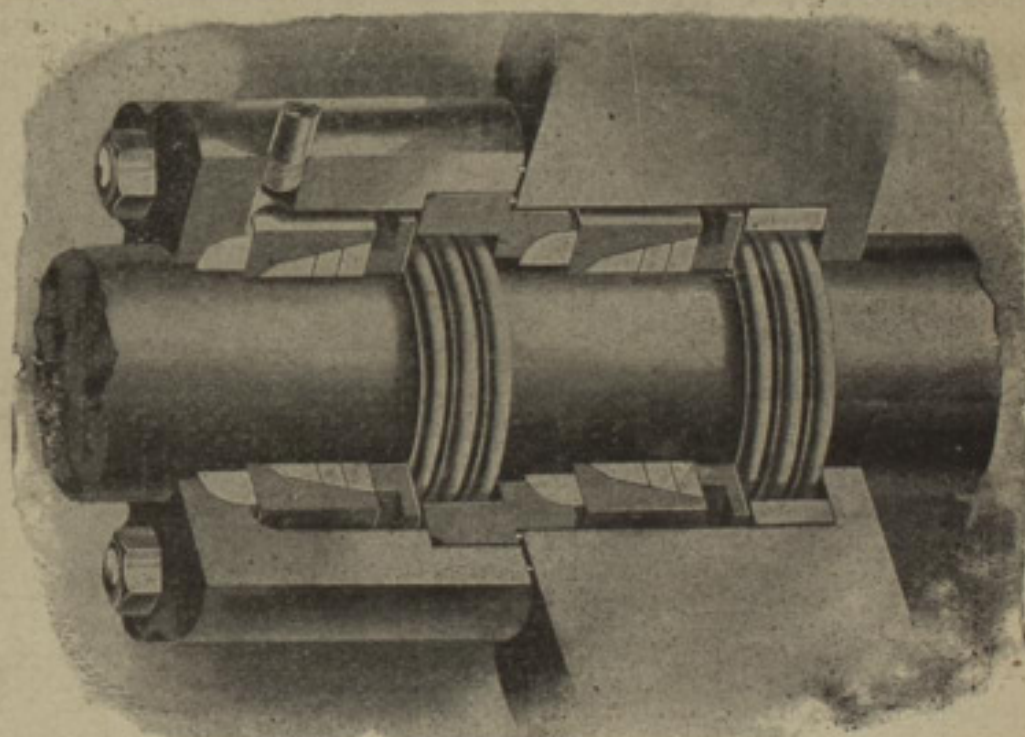
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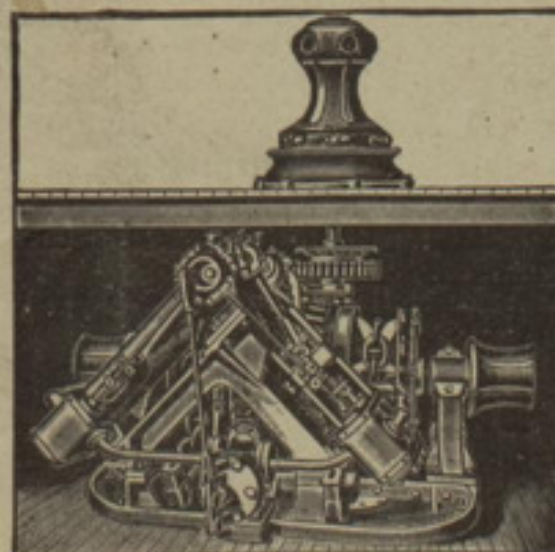
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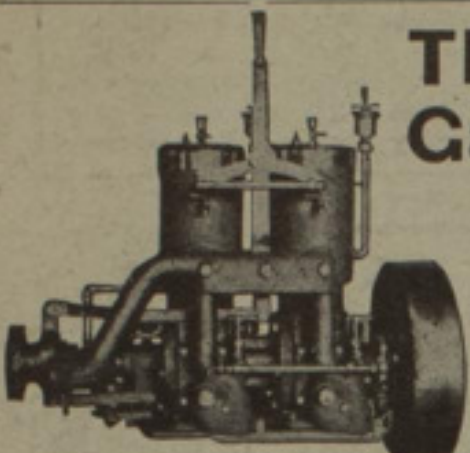
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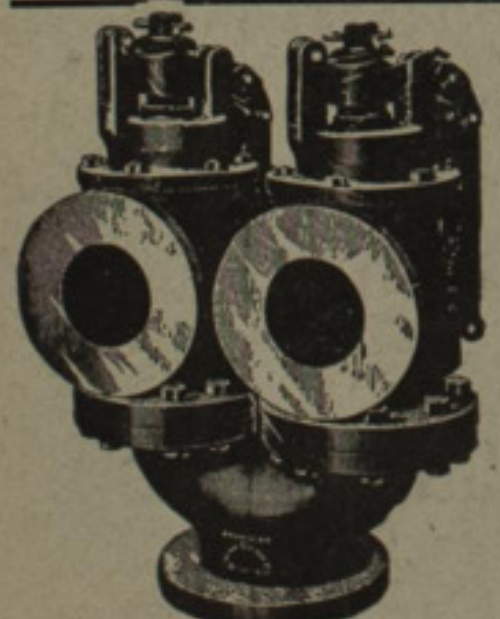
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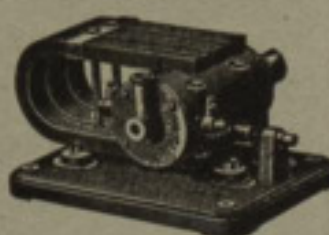


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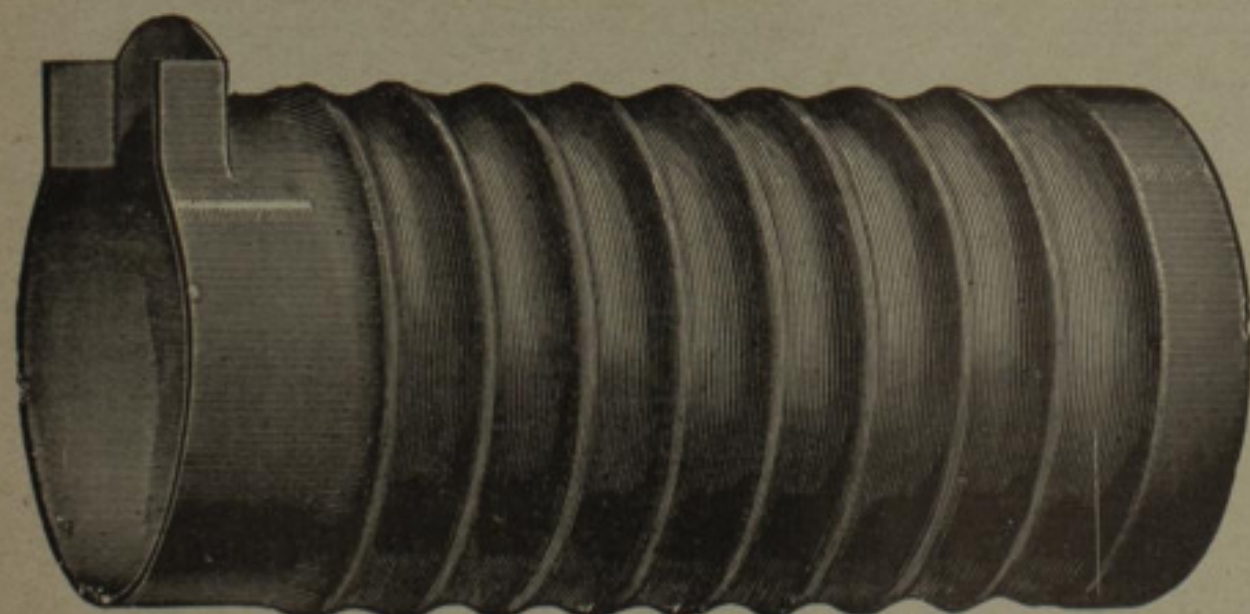
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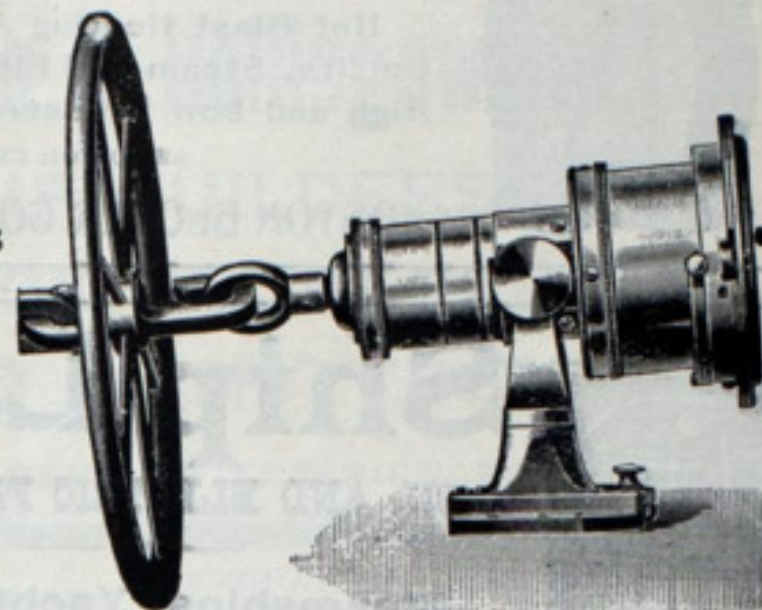
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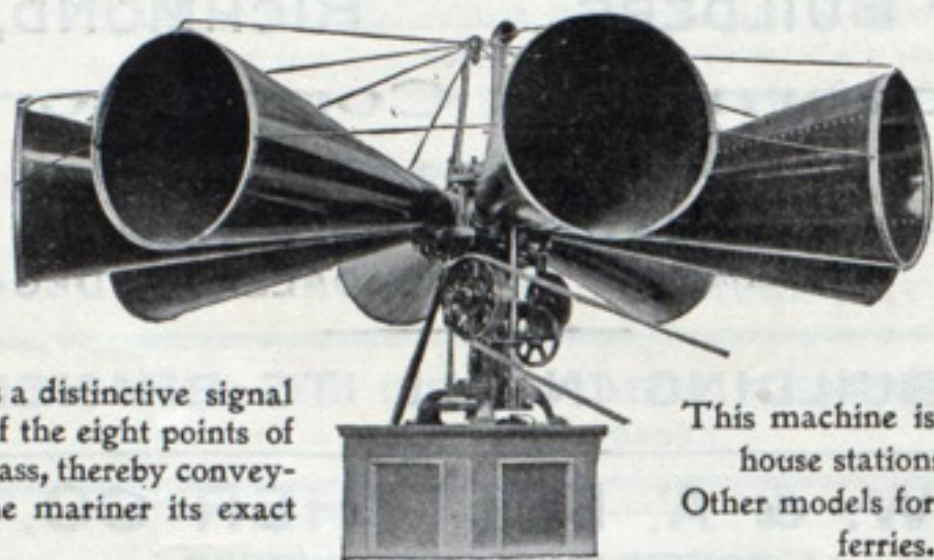
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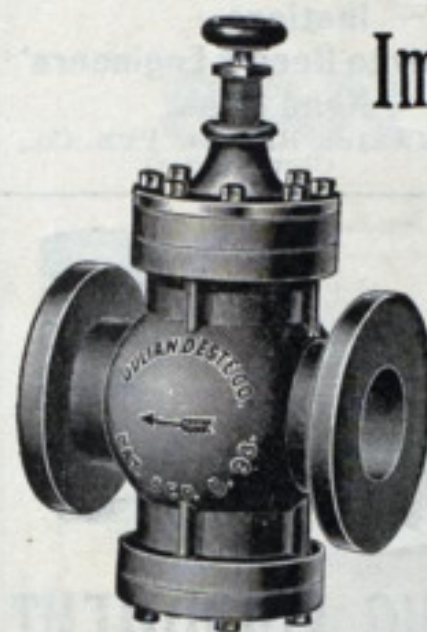
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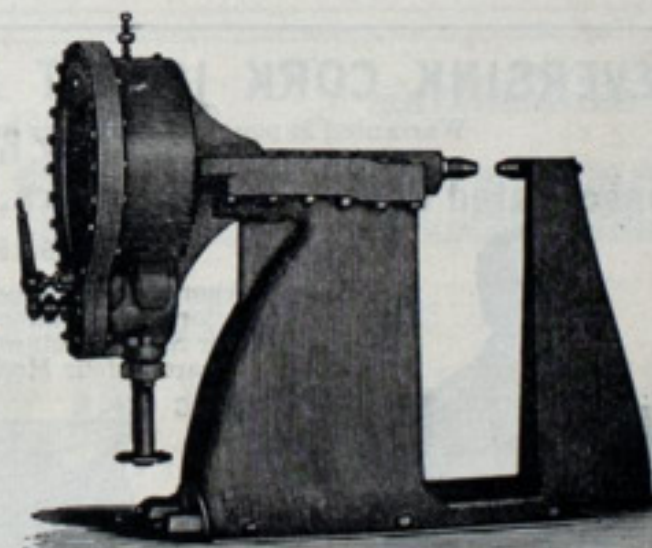
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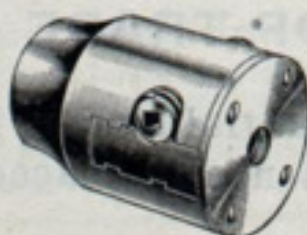
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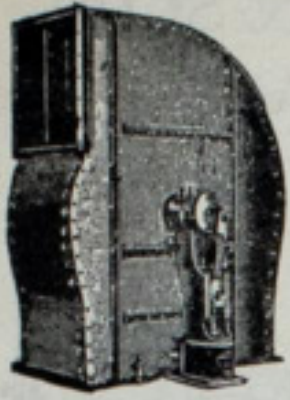
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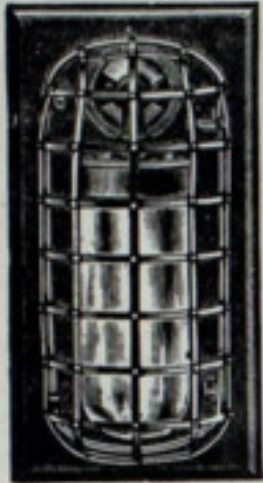
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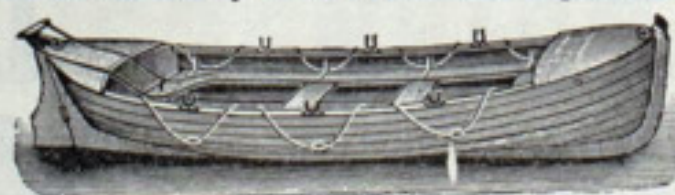
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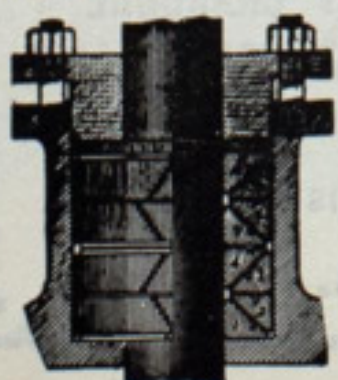
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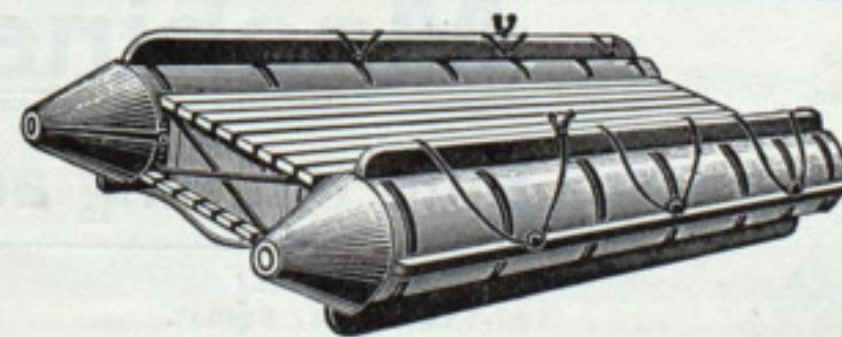
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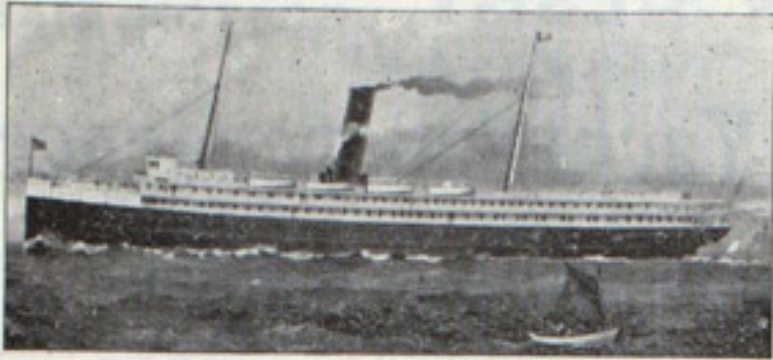
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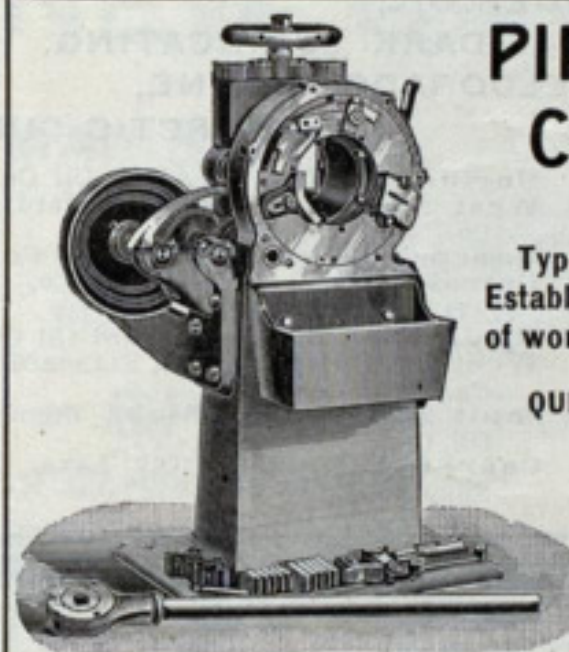
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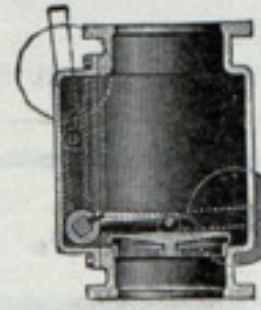
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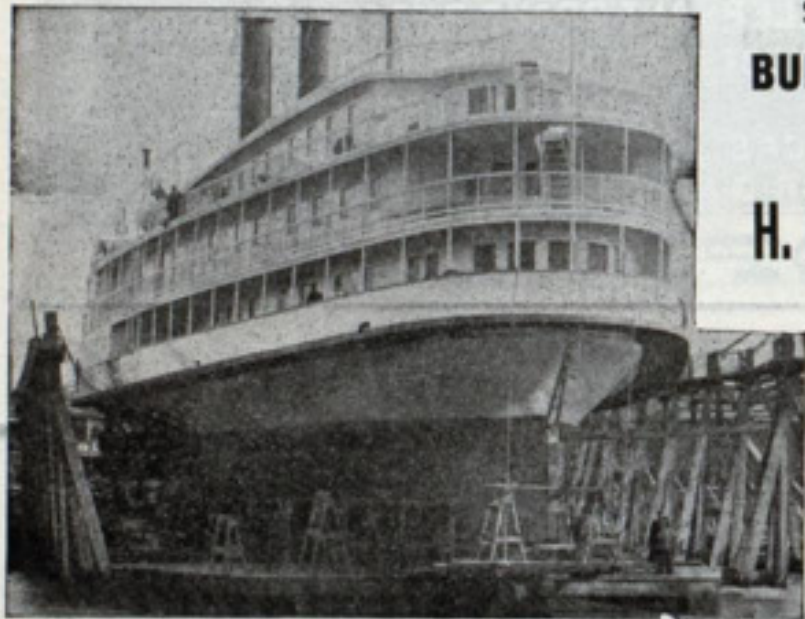
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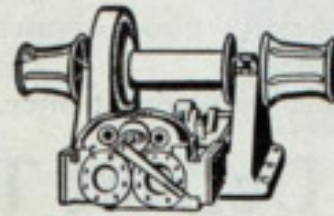
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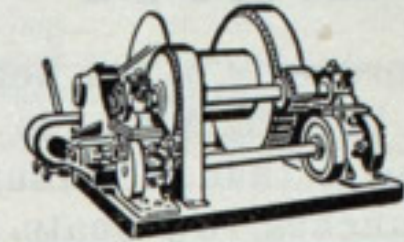
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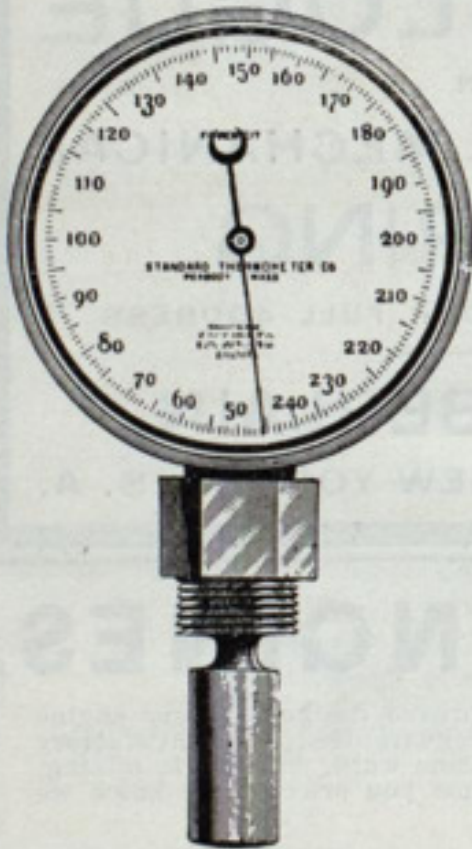
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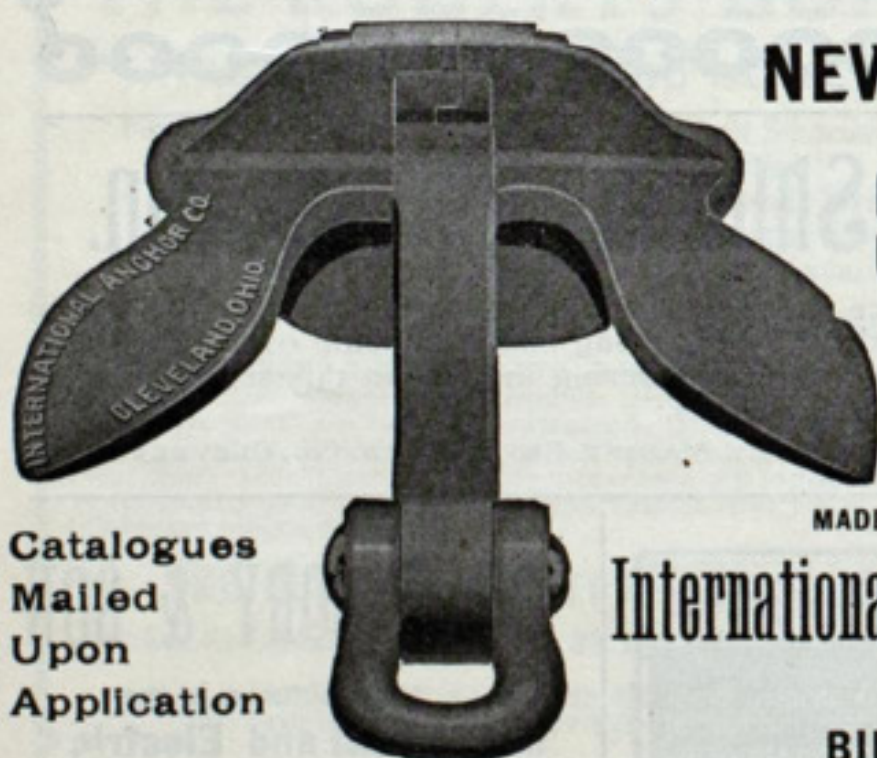
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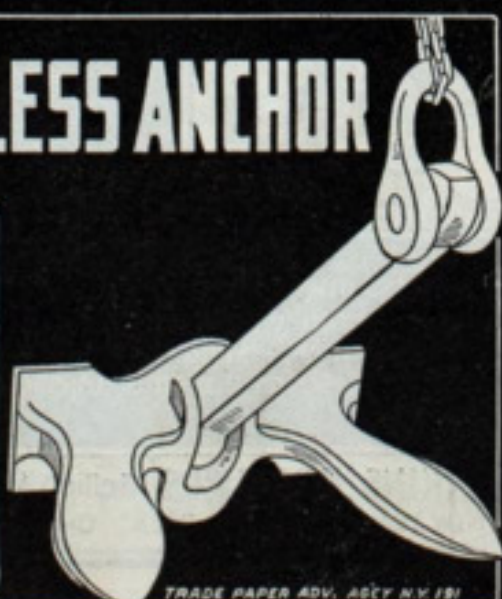
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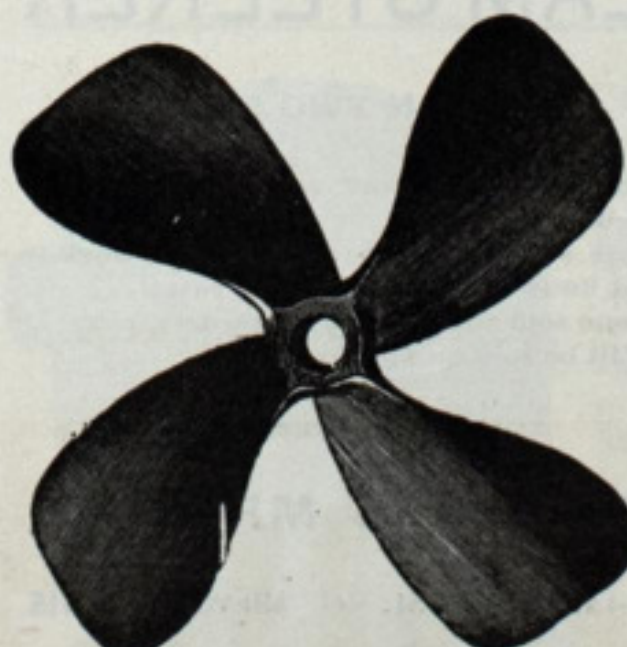
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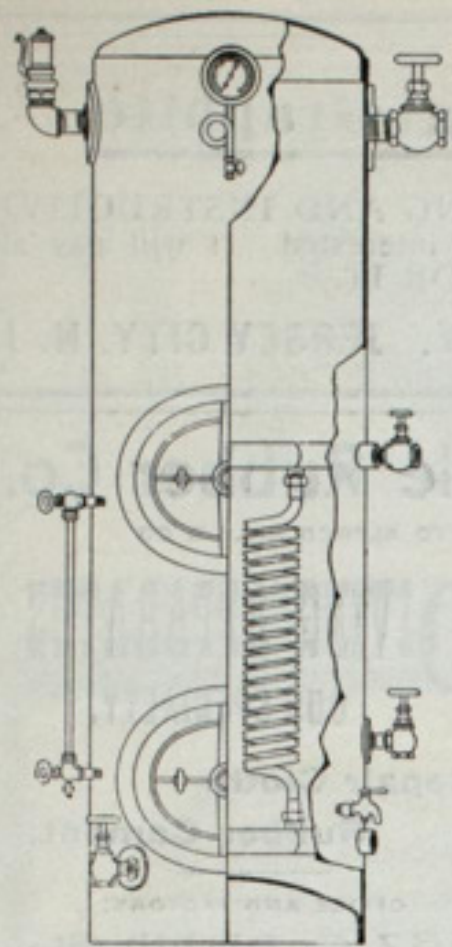
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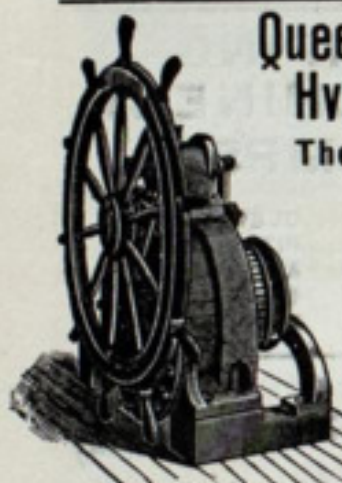
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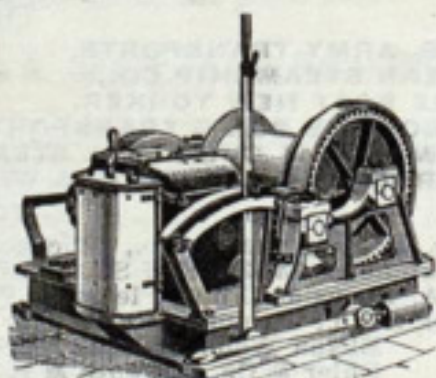
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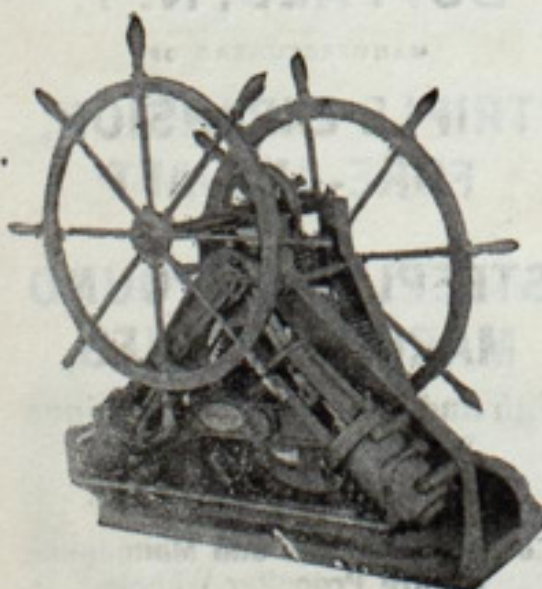
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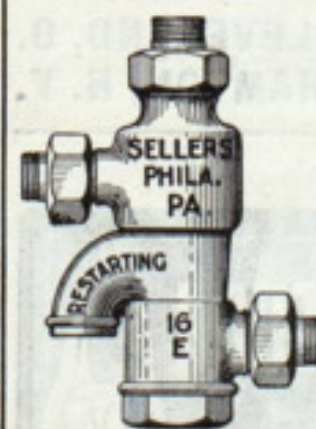
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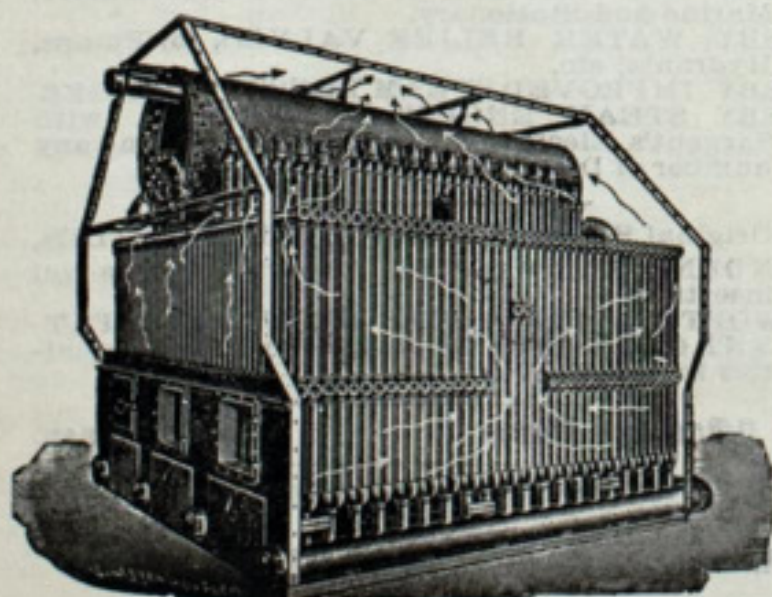
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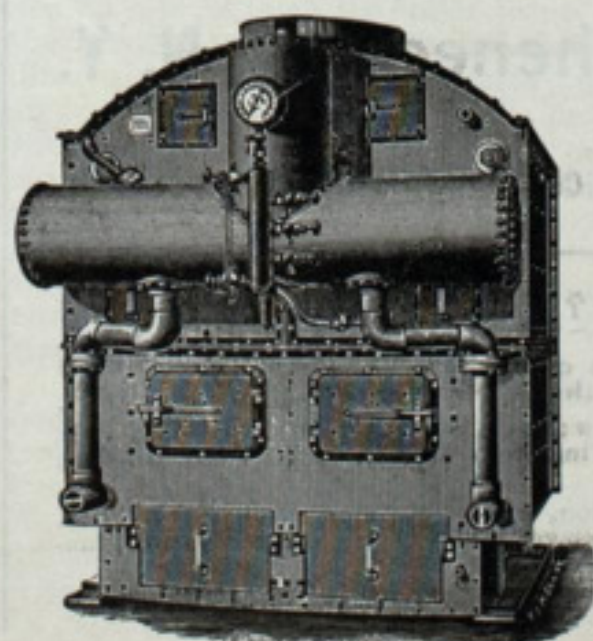
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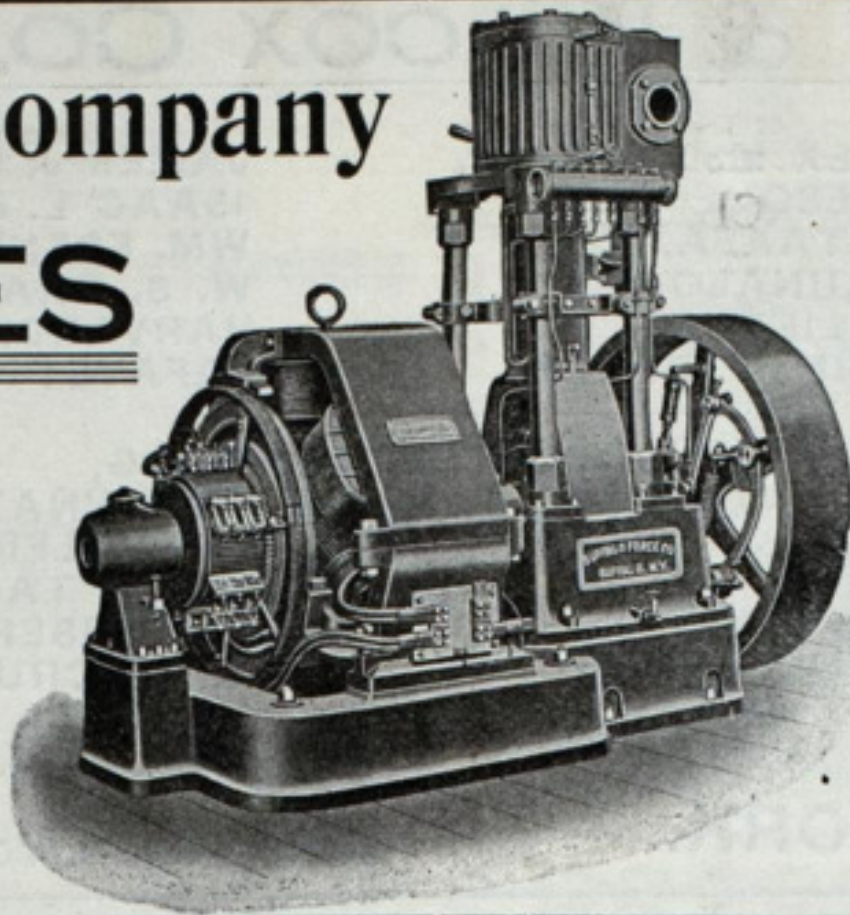
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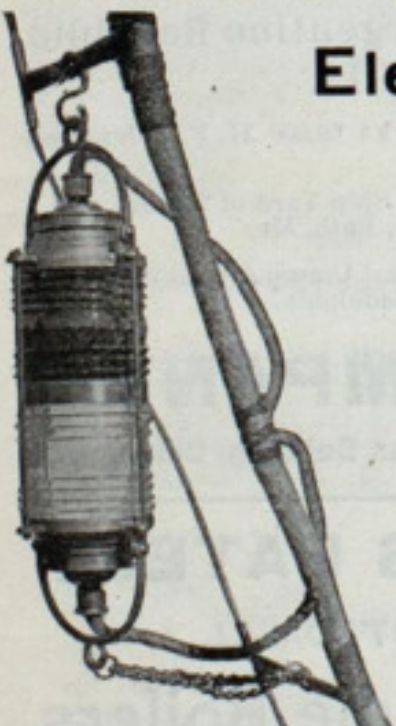
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